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BRITISH MEDICAL JOURNAL

LONDON SATURDAY NOVEMBER 28 1953

CLINICAL TRIALS OF INFLUENZA VACCINE

A PROGRESS REPORT TO THE MEDICAL RESEARCH COUNCIL BY ITS COMMITTEE* ON CLINICAL TRIALS OF INFLUENZA VACCINE

In November, 1951, the Medical Research Council set up a Committee on Clinical Trials of Influenza Vaccine. This report deals with the studies made by the Committee in the winters of 1951–2 and 1952–3.

Small-scale Serological Trials in the Winter of 1951–2

The Committee at its first meeting in December, 1951, decided that, as an epidemic of influenza A was unlikely to develop during the winter of 1951–2, small-scale trials should be organized with the following objects:

(i) To assess by serological methods the comparative value as antigens of vaccines prepared from certain selected virus strains. These were chosen as being representative of the influenza A viruses recovered during the epidemic of influenza in 1950–1.

(ii) To determine the occurrence, severity, and duration of local and general reactions to these vaccines.

(iii) To study the reported illnesses occurring in the inoculated persons, together with symptoms and diagnoses.

(iv) To investigate methods of recording observations to ensure that the documentation in large-scale field trials would be as efficient as possible.

These objects were chosen because the experience of previous field trials had indicated the great importance of choice of virus strain in the vaccine, the need to avoid clinical reactions, and the desirability of assessment of the value of the vaccine by a method wholly free from bias. It was considered that, despite the obvious difficulties of clinical diagnosis, an influenza vaccine which gave useful protection should yield a reduction in clinical illness. Therefore, provided that laboratory tests in the country as a whole indicated the widespread prevalence of influenza virus A infection during a certain period of time, the assumption could be made that a high proportion of the illnesses diagnosed as influenza in controls and vaccinated persons during the same time were probably due to influenza A.

In view of the changes in antigenic structure of epidemic strains of influenza A which had attacked this country since 1946 the following vaccines were selected for trial.

Vaccine A: Made from a virus strain isolated in the Liverpool epidemic of 1951 in threefold concentration expressed in terms of the titre of original allantoic fluid.

Vaccine B: As in A, but in tenfold concentration.

Vaccine C: Prepared from a strain of virus isolated in the Swedish outbreak of late 1950 in threefold concentration.

Vaccine D: As in C, but in tenfold concentration.

These vaccines and those referred to below were prepared by Dr. F. Himmelweit at the Wright–Fleming Institute of Microbiology, St. Mary's Hospital, London, by adsorbing the virus from formolized (1 : 10,000 formaldehyde) allantoic fluids on to aluminium phosphate, followed by washing and resuspending of the deposits in neutral phosphate buffer solution to which merthiolate had been added to a final concentration of 1 : 10,000. The final preparations contained per dose (1 ml.) 10 mg. of aluminium phosphate and in vaccine A 19,200, vaccine B 64,000, vaccine C 12,000, and vaccine D 40,000 haemagglutinating units, as assessed by the "plastic plate" method (W.H.O., 1953) in use at the World Influenza Centre.

For the trial of the vaccines, volunteers were invited from university students, and from hospital nursing staffs in the four metropolitan hospital regions. Some 1,200 volunteers in 11 universities and 30 hospitals thus obtained were at each centre inoculated with the vaccines in serial order, so that approximately equal numbers in each centre received one of the four vaccines. At the time of inoculation each volunteer gave a blood sample for serological examination. A second sample was taken a fortnight later.

The serological investigations were carried out at the World Influenza Centre, Mill Hill, and in the bacteriological departments of Edinburgh and Liverpool Universities, the department of medicine of Sheffield University, and nine selected laboratories of the Public Health Laboratory Service. Haemagglutination inhibition tests were made using formolized egg antigens prepared from viruses homologous with those used in the actual vaccines. The sera were not treated with cholera filtrate before the tests to destroy non-specific inhibitors. A statistical summary of the serological results is shown in Table I.

TABLE I.—*Comparison of Increase in Antibodies With the Various Vaccines*

Vaccine		No. of Volunteers	Agglutination Inhibiting Antibodies		
			Geometric Mean Titre		Rise in Mean Titre (Ratio 2nd to 1st Serum)
			1st Serum	2nd Serum	
Liverpool strain	A—threefold	294	53·0	168·1	3·2
	B—tenfold	294	38·5	188·0	4·9
Swedish strain	C—threefold	294	104·7	300·8	2·9
	D—tenfold	285	98·4	372·9	3·8

The following conclusions were drawn from these trials: (*a*) A slightly greater antibody response was produced by the vaccines made from the Liverpool (1951) virus. (*b*) Any advantage of the tenfold concentration in each case was so slight as not to justify the expense and other disadvantages of its use. (*c*) There was no appreciable difference in the number and severity of reactions produced by the vaccines under trial. (*d*) In a population similar to that under trial and at the same season of the year, about one in three might expect to have respiratory illness of some kind in the

*Members of the Committee: Professor C. H. Stuart-Harris (chairman), Dr. C. H. Andrewes, Dr. W. H. Bradley, Sir Alexander Fleming, Professor A. Bradford Hill, Dr. F. Himmelweit, Dr. F. O. MacCallum, Dr. J. C. McDonald, Surgeon Captain J. G. Maguire, Major-General A. Sachs, Professor Wilson Smith, Wing Commander G. H. Stuart, Dr. I. N. Sutherland, Brigadier A. E. Richmond (secretary).

eight weeks following inoculation. A large number of such illnesses would be ordinary (afebrile) common colds.

Field Trials in the Winter of 1952–3

As an outbreak of influenza A in the winter of 1952–3 seemed probable it was decided that field trials of a pilot nature should be carried out using a selected and a control vaccine. The arrangements made for these trials were as follows.

General Organization

(i) *The Main Trial.*—The main trial was organized in 128 volunteer centres throughout England and Wales, Scotland, and Northern Ireland. These centres were in industrial communities of various kinds (factories, etc.), universities, hospitals, and the fighting Services (Table II). Industrial concerns tended a little to concentration in the North of England, but other centres were scattered more evenly. In all 12,710 volunteers took part.

(ii) *A Subsidiary Trial in Scottish Villages.*—This was carried out in villages scattered along the route from Stornoway to the Butt of Lewis in the Hebrides, with a later extension to Carloway. Volunteers in alternate villages were inoculated with the influenza vaccine, and those in the other villages with the control vaccine. The original intention was that the inoculations should be carried out by the practitioners in their surgeries and at home visits, but it was found necessary to arrange evening sessions in local schools in addition. The programme of inoculations began in late November and was continued into the latter part of December. Although the response to the call for volunteers was not as good as was hoped, helpful information would have been obtained if influenza had developed, but in fact no influenza occurred.

(iii) *A Special Trial at Vauxhall Motors Ltd., Luton.*—The primary object of this investigation was to gain experience of a trial method in which special means were taken to ensure as accurate a diagnosis of influenza as possible. These comprised an overall supervision by one single observer and a more extensive use of laboratory methods. The 455 volunteers who took part are included in the numbers given in (1) above. Results from the more general point of view are included below with those of the main trial. A detailed report of this investigation is to be published separately.

Vaccines

The trial vaccine (X) was polyvalent with equal proportions of a threefold concentration of F.M.1 originally recovered in 1947 in the U.S.A. and of the egg-adapted Liverpool strain (1951). Each dose of 1 ml. contained 9,600 haemagglutinating units of F.M.1 and 12,000 such units of the Liverpool (1951) strain adsorbed on to 10 mg. of aluminium phosphate.

The control vaccine (Y) was a bacterial "anti-influenza" vaccine of low potency, which contained, per 1 ml., 12.5 million *H. influenzae*, 25 million pneumococci, and 2.5 million streptococci, in addition to 10 mg. of aluminium phosphate and merthiolate to a final concentration of 1:10,000.

TABLE II.—*Participants in the Main Trial*

Type of Centre	No. of Centres	No. of Volunteers		Total
		Trial Vaccine	Control Vaccine	
Industrial (factory workers, etc.) ..	36	3,560	3,555	7,115
Hospital (nurses)	59	1,131	1,163	2,294
Universities (students)	13	346	355	701
Services (Army and Royal Air Force personnel)	20	1,303	1,297	2,600
Total	128	6,340	6,370	12,710

Procedure in the Main Trial

Inoculations.—The vaccines were given by deep subcutaneous injection into the left upper arm. Almost all inoculations were given between November 26 and December 5, the few exceptions being completed by December 12. It was hoped that this timing would permit the development of immunization before the expected outbreak of influenza.

Inoculation Registers.—An inoculation register was prepared for each volunteer centre which gave in consecutive order: (*a*) the code letter and serial number to be allotted to the person inoculated; (*b*) the vaccine (X or Y) to be used for each person; (*c*) a blank space for the name and initials of the volunteer. Separate registers were used for males and females. The sequences in which the two vaccines were to be used were based on random sampling numbers and varied in each register, so that, although in each centre approximately equal numbers of volunteers received the trial vaccine and the control, it was not by simple alternation of the two vaccines. It was essential that the vaccine given was strictly in accordance with the registers, and special instructions were issued on this point. It was imperative that those responsible for the subsequent follow-up should not know which vaccine the volunteers had received. All registers were therefore returned to the secretary of the Committee as soon as the inoculations had been completed; no copy of the register was allowed, and no record of the vaccine given was kept on the volunteer's personal record card.

The Follow-up.—Volunteers were questioned about reactions 48 hours after inoculation and then kept under observation until March 31, 1953. A personal record card for each volunteer was kept by the supervising medical officer of each centre. On this form were recorded details of reactions and dates of all absences from work due to illness of two working days or more. For each such absence of an inoculated volunteer in a hospital, university, or Service group the medical officer listed the symptoms complained of and gave his opinion of the diagnosis. In industrial centres each volunteer was given an additional illness record card, which he was asked to present to his general practitioner should he be ill. On it the practitioner was asked to fill in the symptoms and diagnosis of the illness. On completion it could be sent by the practitioner direct to the industrial medical officer concerned or could be handed to the patient for delivery when he returned to work. If this form was not completed by the general practitioner, the industrial medical officer made a restrospective diagnosis by questioning the patient. The personal record card and the illness record card are shown in full in the Appendix. At the end of the trial period the personal record cards were returned for analysis by the Medical Research Council's Statistical Research Unit at the London School of Hygiene and Tropical Medicine, who were also in possession of the inoculation registers.

Reactions to Inoculation.—Local and general reactions were recorded by their severity in four groups: (*a*) nil; (*b*) slight and insufficient to interfere with normal activities; (*c*) moderate and interfering with normal activity; and (*d*) severe and causing absence from work. There was considerable variation in the assessment of nil reactions. The proportion of local reactions so described ranged from 2% to 100% of volunteers in the Service group, and from 4% to 85% in industry. Similarly the general reaction rate described as nil varied from 48% to 100% in the Service group and from 65% to 99% in industry. The nil and slight categories have therefore been combined in Table III. Reactions were if anything slightly less severe among those who had been given the trial vaccine than among those given the control. With both vaccines females suffered more than males.

TABLE III.—*Percentages of Volunteers Experiencing Various Degrees of Reaction*

Severity of Reaction	Local Reactions		General Reactions	
	Trial Vaccine	Control Vaccine	Trial Vaccine	Control Vaccine
Nil or slight ..	97·3%	95·9%	98·2%	97·6%
Moderate ..	2·6%	3·9%	1·2%	1·9%
Severe	0·1%	0·2%	0·5%	0·5%

The Influenza Epidemic of the Winter 1952–3

The rise in the number of deaths from influenza in the great towns of England and Wales and the increase in claims upon the Ministry of National Insurance indicated that influenza was prevalent in Britain during the first quarter of 1953. The first laboratory evidence of influenza virus A infection was obtained from single isolations of virus from Kent on December 8, 1952, and from Surrey on December 30, 1952; subsequent tests confirmed that the epidemic which followed was due to the same virus. Weekly totals of positive tests for influenza A in the laboratories of the Public Health Laboratory Service confirm that influenza A was prevalent during the first 10 weeks of 1953. The rise in influenza mortality in 160 great towns in this period indicated the same. Analysis of laboratory results by geographical regions suggests that the peak of the epidemic was reached earlier in the south and east than in the north and west. While the trial was in progress about 5% of all cases of influenza diagnosed serologically by the Public Health Laboratory Service were due to influenza virus B. The strains of influenza virus A recovered during the epidemic and which were examined in detail at the World Influenza Centre, London, were reported as being antigenically related to but not identical with those recovered in 1951 (personal communication from Dr. C. H. Andrewes).

Laboratory confirmation of the presence of influenza among volunteers was not planned, but evidence of influenza virus A infection was in fact obtained from volunteers in four out of eight centres from which material for laboratory examination was collected. Specimens from uninoculated persons were tested and found positive in 8 of a further 12 centres. In addition, at least one case of influenza A was confirmed in 33 of the 41 counties of the United Kingdom in which there were trial centres. It seems probable, therefore, that many of the volunteers would have incurred some exposure to the risk of infection with influenza A between one and three months after inoculation.

Results of the Main Trial

It was unfortunate, so far as this trial was concerned, that the incidence of influenza A was comparatively slight. The disease was also largely confined to Southern England, and in those areas in which it occurred it did not invariably spread. As a result there was no evidence of influenza in volunteers in more than one quarter of the centres, while in the remainder the incidence was low.

A summary of the sickness experience of volunteers is given in Table IV.

TABLE IV.—*Absences Due to Illness in Vaccine and Control Groups*

Diagnosis	Trial Vaccine (6,340)		Control Vaccine (6,370)		Difference between Percentages and Standard Error of Difference
	No. of Attacks	% Attacked	No. of Attacks	% Attacked	
Influenza ..	192	3·0	309	4·9	1·9±0·34
Febrile cold ..	218	3·4	242	3·8	0·4±0·33
Febrile sore throat	86	1·4	86	1·4	0·0±0·20
Other respiratory diseases ..	131	2·1	145	2·3	0·2±0·26
Non-respiratory diseases ..	253	4·0	208	3·3	−0·7±0·33
Total ..	880	13·9	990	15·5	1·6±0·65

It may be seen that the difference between the influenza attack rates in the two groups, 1.9±0.34, was statistically significant, while the differences in incidence of febrile cold, febrile sore throat, and other respiratory diseases were not significant. The volunteers who received the trial vaccine had more absences due to non-respiratory diseases than those who received the control vaccine. Though the difference is just significant statistically, it may have been due to chance or there may be some other explanation. It is clear, however, that the absence rate due to all causes is still significantly less in the volunteers who received the trial vaccine.

TABLE V.—*Influenza Attack Rate by Type of Centre Vaccine and Sex*

	Males		Females	
	Trial Vaccine (X)	Control Vaccine (Y)	Trial Vaccine (X)	Control Vaccine (Y)
Industry:				
No. exposed to risk ..	2,820	2,816	740	739
No. of attacks ..	94	147	29	53
Percentage attack rate	3·30	5·22	3·92	7·17
Difference (X–Y)	−1·92±0·54		−3·25±1·19	
Services:				
No. exposed to risk	1,169	1,162	134	135
No. of attacks ..	25	31	2	9
Percentage attack rate	2·14	2·67	1·49	6·67
Difference (X–Y)	−0·53±0·63		−5·18±2·41	
Hospitals:				
No. exposed to risk ..	100	94	1,031	1,069
No. of attacks ..	3	8	27	44
Percentage attack rate	3·00	8·51	2·62	4·12
Difference (X–Y) ..	−5·51±3·32		−1·50±0·79	
Universities:				
No. exposed to risk ..	249	257	97	98
No. of attacks ..	7	15	5	2
Percentage attack rate	2·81	5·84	5·15	2·04
Difference (X–Y)	−3·03±1·81		+3·11±2·66	

A more detailed analysis of the absences ascribed to influenza in male and female volunteers in the main trial groups is shown in Table V.

In seven of the eight comparisons the influenza attack rate was lower in the trial vaccine group, though it was only in the industrial group that the difference was statistically significant. In the remaining groups the differences were too small to be significant on the numbers concerned. In the female university students the influenza attack rate was higher in those given the trial vaccine, but the numbers at risk were small and the total absences due to influenza were only 7. Of the cases of influenza in the industrial group, 78.5% were diagnosed by general practitioners whose co-operation in the trial was both essential and unstinted.

Regional Differences.—From the available national records of influenza mortality in the great towns the intensity of the influenza outbreak varied from south to north. It was thought of interest, therefore, to compare the results in the trial from the areas with a high incidence in their large towns with those from areas with medium and with low incidences. Deaths per 100,000 of the large town populations in the first quarter were found, and Wales, the northern region, and the north-west region, with rates of 8.1 or less, were taken as areas of low incidence, and London and the south-eastern counties, the eastern, south-western, and the southern regions, with rates of 16.2 or more, were taken as areas of high incidence. Those with rates between 8.1 and 16.2 were regarded as areas of medium incidence. The results obtained are shown in Table VI. It will be noted

TABLE VI.—*Influenza Attack Rates in Different Areas of England and Wales*

	Trial Vaccine (X)		Control Vaccine (Y)		(X–Y) Differences
	No. Exposed	% Attacked	No. Exposed	% Attacked	
Areas of low influenza incidence ..	2,160	2·92	2,194	3·60	−0·68±0·5
Areas of medium influenza incidence	2,992	2·81	2,995	5·08	−2·27±0·5
Areas of high influenza incidence ..	1,188	3·79	1,181	6·61	−2·82±0·9

that while in each group of areas the influenza attack rate in those receiving the control vaccine exceeded the rate in those given the trial vaccine, the difference grew more pronounced as the incidence of influenza increased (as estimated from mortality data).

Seasonal Differences.—An examination was made of the weekly absence rates on account of influenza, febrile cold, febrile sore throat, and other illnesses, in the trial and control groups from the week ending December 29, 1952, to that ending March 30, 1953. No table is given, as the information added nothing material to that already obtained and the length of time since inoculation did not appear to be a factor determining the differences between the trial and control groups already mentioned.

Discussion

A full recapitulation of the various publications dealing with the results of trials on influenza virus vaccines in man is deemed unnecessary in this report because excellent reviews have appeared recently—for example, Frances (1953). Previous trials of influenza vaccine have ended sometimes with results of an equivocal character either because of the low incidence of influenza experienced both in control groups and in those given vaccine or because of a lack of identity between the virus strains incorporated in the vaccine and the viruses causing the outbreak. This latter reason may have been responsible for the failure of the vaccine to exert protection in the previous large-scale trial in this country in 1947 (Mellanby *et al.*, 1948) and in America in the same year. It will be recalled that these failures followed upon the successful use of vaccine in diminishing the incidence of influenza A in the American trial in 1943 (U.S. Commission on Influenza, 1944). Thus, doubt has existed concerning the value of a vaccine against the strains of influenza virus A which have been encountered in epidemics in all parts of the world since 1947 and whose antigens have deviated widely from those of viruses encountered before 1946. Trials carried out in the U.S.A. recently (Meiklejohn *et al.*, 1952) provided evidence that if the vaccine contains virus strains with antigens resembling the viruses causing the outbreak some protection is conferred by immunization. In these American trials the diagnosis of influenza in controls and immunized men was based upon the serological tests rather than on clinical findings, because of the well-known difficulty of clinical diagnosis, particularly in Service establishments.

The present report indicates that major consideration was given by the Committee to the problem of the particular virus strain to be used in the vaccine and also to the method of assessment of illness in those taking part in field trials. The small-scale trials carried out in the winter of 1951–2 were designed partly to test methods of recording likely to be used in a large-scale trial and partly to give evidence of the relative potency in stimulating antibodies of two antigenically distinct virus A strains similar to strains recovered during the 1950–1 epidemics in Europe (Isaacs, Gledhill, and Andrewes, 1952). The vaccine used in the large-scale trial in the winter of 1952–3 contained two chosen strains—one the Liverpool 1951 strain, and the other a strain originally isolated in 1947 (F.M.1) which had been used in the American trial already mentioned (Meiklejohn *et al.*, 1952).

The vaccines used in both winters were essentially similar to those employed in previous British and American trials but differed in their low content of non-specific protein. The purification was achieved by the use of aluminium phosphate, which adsorbs selectively many influenza viruses from infected allantoic fluids (F. Himmelweit, details to be published elsewhere). Its retention in the final preparation has the added advantage of retarding the rate of absorption of the vaccine from the site of inoculation. The decision to use aluminium-phosphate-adsorbed vaccines was based upon the experience of other workers (Appleby *et al.*, 1951) that a low rate of both local and general reactions could be anticipated with this type of preparation.

The decision to rely upon clinical methods for the diagnosis of illness in inoculated persons during the follow-up period was made after consideration of the practical difficulties which exist in obtaining blood and garglings at a sufficiently early stage of illness in those living at home or in lodgings. Moreover, doubt exists concerning the validity of some of the serological methods commonly used for the diagnosis of influenza in individuals who have previously been immunized with influenza virus antigens. Some evidence in confirmation of this difficulty was obtained in the subsidiary trial carried out at Luton. Thus, although there is undoubted difficulty in arriving at a diagnosis of influenza on purely clinical grounds, this method was chosen as the main method of assessment in the large-scale trial. The alternative diagnoses of "febrile sore throat" and "febrile cold" were suggested for illnesses of the respiratory tract which might be confused with influenza but which are endemic in the population during the winter season. Illnesses which caused an absence from work of less than two days were excluded from the records in order to avoid inclusion of common colds.

The evidence obtained in the laboratory that influenza virus A was actually causing infection in the groups of persons taking part in the 1952–3 trial, though indirect, was nevertheless regarded as valid. The differences found between the several categories of clinical illness in the two groups of inoculated individuals who took part in this trial were slight, but provided definite evidence of a protective action by the virus vaccine. For, if the latter had been without effect, it is difficult to understand why there should have been a difference in the number of illnesses clinically diagnosed as influenza, particularly when the recorded cases of febrile colds and febrile sore throats were so similar in number in the control and virus vaccine groups. The reduction of influenza attacks in those receiving the virus vaccine is therefore believed to be real. The figures set out in Table VI may indicate that one reason for the relatively slight protective effects was the generally low incidence of influenza in both groups: protection was apparently greater in areas of high influenza mortality than in those where it was low. It is important to stress the fact that the clinical workers and those who recorded the illnesses had no knowledge of the particular type of vaccine received by an individual. The recording of the clinical illness during the follow-up was blindfold. The results obtained are not explicable on the basis of a bias for or against the use of the term influenza for illnesses in individuals in any particular category.

Summary

Small-scale trials in the winter of 1951–2 allowed of the assessment by serological methods of the comparative value as antigens of certain influenza A vaccines.

Large-scale controlled field trials of an influenza A vaccine were carried out in 128 centres in the winter of 1952–3. This vaccine contained equal proportions of a three-fold concentration of F.M.1 (U.S.A. 1947 strain) and of the Liverpool (1951) strain. There were in addition subsidiary trials in villages in the Hebrides and in the Vauxhall works at Luton.

In the main trial there was an attack rate of clinical influenza of 3% in 6,340 volunteers in the trial vaccine group and of 4.9% in the control group of 6,370 volunteers. This is equivalent to a 40% reduction in influenza in the former group as compared with the control. Other acute respiratory conditions occurred equally often in vaccinated and control groups.

Information was also obtained about the extent and degree to which reactions occurred in the inoculated, and about other matters of interest, details of which are reported.

No outbreaks of influenza developed in the Hebrides. No results were therefore forthcoming.

The trial at Luton, of which the main object was to gain experience of special methods of ensuring accurate diagnosis, is to be reported on separately.

Acknowledgments

The Committee wishes to acknowledge the support and co-operation it has received from many sources, and without which little could have been achieved. It is very grateful to all those in industries and in the hospitals, universities, fighting Services, and elsewhere, throughout the United Kingdom who volunteered for inoculation in the earlier serological tests or in the later field trials. It is most grateful to those in the various volunteer centres who so kindly went to much trouble to collect volunteers to make the necessary local arrangements for the trials, and to shoulder the various responsibilities involved in the trials. The help of the Public Health Laboratory Service was invaluable, particularly of

its Central Laboratory at Colindale, and the laboratories at Cambridge, Manchester, Bradford, Nottingham, Newcastle-upon-Tyne, Cardiff, Exeter, Hull, and Winchester. The fullest assistance on the serological side was forthcoming also from the departments of bacteriology at Edinburgh and Liverpool Universities and from the medical department of Sheffield University. The laboratory of the World Influenza Centre at the National Institute for Medical Research at Mill Hill, including especially Dr. A. Isaacs of that laboratory, gave considerable help with the more technical aspects of the problems involved.

The Committee is deeply appreciative of the help afforded by Dr. W. J. Martin, of the M.R.C. Statistical Research Unit at the London School of Hygiene and Tropical Medicine, who spared no effort to assist in the organization of the trials and the analysis of the results.

The Committee would finally express its gratitude to the Wright-Fleming Institute of Microbiology at St. Mary's Hospital, where under the direction of Dr. F. Himmelweit the vaccines for the trials were produced, and where many of the preliminary investigations essential to their large-scale production were carried out.

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APPENDIX

FORM A

Serial Number of Volunteer [ ]

MEDICAL RESEARCH COUNCIL

TRIALS OF INFLUENZA VACCINES

PERSONAL RECORD CARD

Name of Inoculation Centre .....

Name and Initials of Volunteer .....

Regimental No. and Rank .....(*Services only*)

Age last birthday .....

Sex .....

Date of Inoculation .....

REACTIONS TO INOCULATION:

(Put a cross against appropriate answers)

Local	*General*
(*a*) Nil.	(*a*) Nil.
(*b*) Slight and insufficient to interfere with normal use of arm.	(*b*) Slight and insufficient to interfere with normal activities.
(*c*) Moderate and interfering with normal use of arm.	(*c*) Moderate and interfering with normal activities.
(*d*) Severe causing absence from work.	(*d*) Severe causing absence from work.

Date of observation .....

P.T.O.

Record of all absences from work or duty due to illness and lasting 2 days or more

	1st absence	2nd absence	3rd absence	4th absence
Date of onset of illness				
Date of first absence from work or duty				
Number of days in bed				
Date of return to work or duty ..				
Symptoms (under each heading grade as nil, slight, moderate, or severe)				
Shivering				
Sweating				
Headache				
Muscular pains				
Sore throat				
Running nose				
Prostration				
Pyrexia (state yes or no, and if yes give maximum temperature observed or reliably reported) ..				
Any other specially marked symptoms				
Final diagnosis (state yes against appropriate heading) Febrile cold				
Febrile sore throat				
Influenza				
Other illness (to be specified) ..				

FORM B

MEDICAL RESEARCH COUNCIL

TRIALS OF INFLUENZA VACCINES

ILLNESS RECORD CARD

(Full name)

The holder of this card ..... has been inoculated in the trials of influenza vaccines now being conducted by a special Committee of the Medical Research Council.

In the event of any illness occurring within three months after inoculation and which confines the holder to bed, he/she has been asked to call in his/her usual medical attendant and to present this card.

The Committee would be very grateful if you, the medical attendant, would give on the back of this card a few particulars of the patient's present illness, paying special attention to the diagnosis.

On completion the card should be placed in the envelope supplied.

On returning to work the patient will report with it to the industrial medical officer who is supervising the trial on behalf of the Committee. If you prefer, the card may be posted to the test centre named on the envelope.

Any further information required can be obtained from this centre.

P.T.O.

PARTICULARS OF ILLNESS

Symptoms	**(underline appropriate answer for each symptom)**			
Shivering	none	slight	moderate	severe
Sweating	none	slight	moderate	severe
Headache	none	slight	moderate	severe
Muscular pains	none	slight	moderate	severe
Sore throat	none	slight	moderate	severe
Running nose	none	slight	moderate	severe
Prostration	none	slight	moderate	severe
Pyrexia	yes	no	not known	

If present, maximum temperature observed or reliably reported .....

Any other specially marked symptoms .....

.....

.....

.....

Final diagnosis **(underline appropriate answer)**

Febrile cold
Febrile sore throat
Influenza
Other illness .....

Date ..... *Signed* .....

LABORATORY EVIDENCE OF INFLUENZA IN ENGLAND AND WALES DURING THE WINTER OF 1952-3

A REPORT FROM THE PUBLIC HEALTH LABORATORY SERVICE*

During the winter of 1952–3 an intensive effort was made to confirm the presence of influenza virus infections in as many parts of England and Wales as possible. The aims were to obtain early evidence of the presence and types of infecting viruses as part of the scheme for "Winter Epidemics" described in the Monthly Bulletins of the Ministry of Health and the Public Health Laboratory Service for December, 1951, and November, 1952, and to provide a representative number of virus strains for the antigenic and epidemiological studies of the World Health Organization, World Influenza Centre.

The complement fixation test with influenza A and B "soluble" antigens was used for the serological tests, and only fourfold or greater increases in antibody between suitably spaced pairs of serum specimens were considered significant. Virus isolations were made by amniotic inoculation of fertile hens' eggs.

The specimens were received from many sources, of which the most important were medical officers of health and general-practitioner "spotters," who provided material from cases of uncomplicated influenza under the winter epidemics scheme. Service medical officers provided similar material, and pathologists, Service and civilian, submitted specimens mainly from cases of pneumonia in which a virus aetiology was suspected. In addition, information was exchanged with Captain J. E. Stauch, of the U.S. Air Force Laboratory in London (494th Clinical Laboratory).

Laboratory Evidence

Influenza A.—The first evidence of the presence of influenza A infection was the isolation of virus from the post-mortem specimen of lung obtained from a patient dead with pneumonia in North-west Kent in the second week of December. Shortly afterwards infection with influenza A was confirmed in an outbreak of respiratory disease amongst the residents of a nurses' home in North Surrey. This outbreak began in the second and third weeks of December, and continued till the end of the month. During the last week of December civilian and R.A.F. cases of influenza A were confirmed in Somerset (Taunton area), Army cases in Surrey (Camberley), and cases were reported by the U.S.A.F. laboratory from units in Oxfordshire, Gloucestershire, and Bedfordshire. At the end of the first week of January positive tests were obtained from Naval personnel in Devon (Plymouth), from Army personnel in Nottinghamshire (Chilwell), from R.A.F. personnel in Buckinghamshire (Halton), and from civilians in Surrey (Epsom), Sussex (Eastbourne), Lancashire (Manchester), and Bedfordshire (Bedford).

During the second week of January further cases were confirmed in the southern areas, and cases were detected in a Service unit in Yorkshire (Middlesbrough), from R.A.F. units in Essex, Norfolk, and Suffolk, and from civilians in Cambridgeshire (Cambridge) and Suffolk (Ipswich). At the end of the second week cases were first reported in Wales (Cardiff).

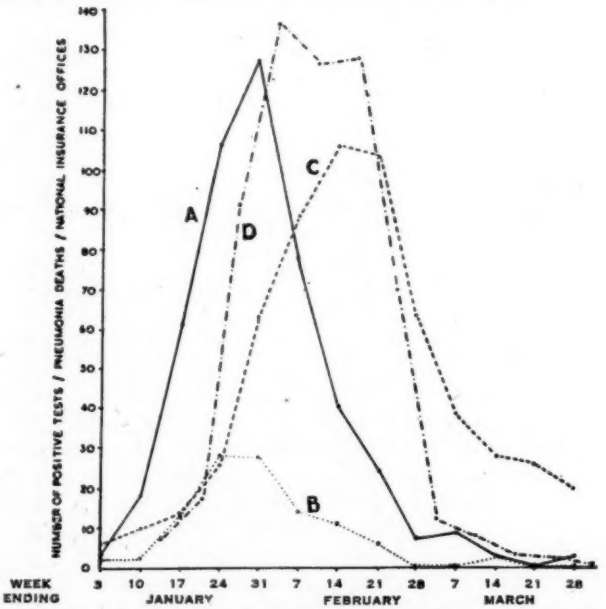
In the third week of January cases were detected in all parts of the country, and in Tables I and II positive tests obtained between January and June, 1953, are shown classified by the week in which specimens were collected, and the Registrar-General's geographical regions of England and Wales.

Influenza B.—A small number of cases of influenza B were detected. Weekly and regional totals of positive laboratory tests are included in the margins of Tables I and II.

Influenza A

Timing of the Epidemic

The first cases of influenza A were detected in mid-December, but no marked increase in the weekly totals of positive tests was observed till the second week of January. During the remainder of January the number of cases detected rose and the peak of positive serological tests occurred in the week ending January 31. In February the numbers decreased rapidly. A small number of cases were detected in March and only one in April. More than 50% of sera were positive between the weeks ending January 17 and February 7, and so it is concluded that the peak of the influenza A epidemic occurred between these dates and most probably during the last week of January. However, since in some areas specimens were not submitted after the presence of infection had been established it seemed desirable to check this conclusion by other means. The Registrar-General's weekly returns for deaths from influenzal pneumonias in the 160 great towns provide an index of the progress of an epidemic (Logan, 1951), and these figures, together with the weekly totals of positive laboratory tests, are shown in the Chart. The numbers of sickness benefit claims (from all causes) received at the Ministry of National Insurance and Pensions have also been shown to provide a basis for assessing the progress of an epidemic (Massey, 1951). Figures showing the numbers of local offices of the Ministry which received claims in excess of 225% of those for November, 1952, were available, and these are also shown as weekly totals in the Chart. (It should be noted that



Weekly totals of positive laboratory tests, deaths from influenzal pneumonia, and the number of local offices of the Ministry of National Insurance which received excess notifications of sickness. A = Influenza A, positive serological tests. B = Influenza A, virus isolations. C = Influenzal pneumonia deaths in 160 great towns (reduced to one-fifth true vertical scale). D = Number of Ministry offices which received an excess of sickness notifications (reduced to half true vertical scale).

*Serological and virus isolation tests were undertaken at the Virus Reference Laboratory, Colindale (Drs. B. E. Andrews, G. B. Bruce White, and J. C. N. Westwood), and at the Northampton Laboratory (Drs. L. Hoyle and A. J. Beale). Serological tests were undertaken at the following laboratories: Exeter (Drs. B. Moore and E. M. Mackay Scollay), Manchester (Dr. M. O. Adams), Winchester (Dr. R. D. Mackenzie), Cardiff (Dr. A. D. Evans), Nottingham (Dr. G. B. Ludlam), Cambridge (Dr. P. J. Wormald), Hull (Dr. J. McCoy), and Newcastle-upon-Tyne (Dr. C. R. Peck).

TABLE I.—*Cases of Influenza Confirmed by Serological Tests**

Week Ending:	January 3	10	17	24	31	February 7	14	21	28	March 7	14	21	28	April 4	11	18	25	May 2	9	16	23	30	June 7	14	20	Totals Influenza A	Influenza B	Negative
Cases of influenza A in regions:																												
I. Northern			1	5	2	9	6	4	2	2																31	0	6
II. E. and W. Ridings, Yorks				2	12	6	1	1	1	1																24	2	97
III. North Midland			1	4	23	6	8	4						1												47	0	34
IV. Eastern			14	20	13	19	6		2																	74	5	86
V. London and South-eastern	2	1	5	35	22	13	7	2		3	1		1													92	22	226
VI. Southern			30	13	23	4		4		1																75	6	72
VII. South-western	1	9		16	11	2	3						1													43	2	65
VIII. Wales				2	2	4	2		2	2																14	3	52
IX. Midland		1		6	8	11	5	3			1															35	0	31
X. North-western		7	10	4	12	3	2	6																		44	1	55
All regions:																												
Influenza A	3	18	61	107	128	77	40	24	7	9	2		2	1												479		
„ B			1	1	3		3	2	2	3	1	4	7		5	2	2		2	2		1					41	
Negative tests	19	29	49	66	112	63	45	74	38	41	17	28	27	20	19	10	10	10	8	6	7	1	4	5	5			724

* For cases in December, 1952, see text.

TABLE II.—*Cases of Influenza Confirmed by Virus Isolation**

Week Ending:	January 3	10	17	24	31	February 7	14	21	28	March 7	14	21	28	April 4	11	18	25	May 2	9	16	23	30	June 7	14	20	Totals Influenza A	Influenza B	Negative
Virus A isolations in regions:																												
I. Northern					5	1	2	2																		10		33
II. E. and W. Ridings, Yorks					1		1	1																		3		12
III. North Midland				3	3	3	3																			12		60
IV. Eastern		1	4	10	3	1	1																			20		123
V. London and South-eastern	2		2	6	3	2	1	1		2																19	2	164
VI. Southern			5	2	4																					11		77
VII. South-western			2	2	5		1	1																		11	1	53
VIII. Wales					2	6	1																			9		12
IX. Midland				4	1		1																			6	1	46
X. North-western		1†		1	1	1		1																		5		25
All regions:																												
Influenza A	2	2	13	28	28	14	11	6		2																106		
„ B								1		1						2											4	
Negative	9	10	68	147	142	59	76	54	10	5	10		4		1		3	1	5				1					605

* For cases in December, 1952, see text. † Virus isolated by Dr. J. O'H. Tobin, Department of Bacteriology, University of Manchester.

the vertical scales of the curves in the Chart have been adjusted to emphasize their time relations, and actual numbers, except in the case of laboratory results, cannot be read direct from the printed scale.) Bearing in mind the relatively small number of cases of influenza B detected by laboratory tests, it seems reasonable to conclude that influenza virus A infection was associated with a large proportion of the illnesses and fatal cases of influenzal pneumonia which, as shown by the curves of the Chart, occurred in the last week of January and during February. The figures for positive laboratory tests began to rise and reached their peak about one week earlier than those for the excess sickness benefit claims, and about two weeks before those for the pneumonia deaths. These differences in time would be accounted for respectively by the interval between the onset of illness and the presentation of sickness benefit claims at the offices of the Ministry of National Insurance, and by the interval between the onset of influenza and the pneumonia which subsequently led to death. It is assumed that most of the pneumonias were of the post-influenzal type rather than the fulminating acute type sometimes observed during an influenza epidemic.

Thus there seems to be substantial agreement between estimation of the time limits for the epidemic arrived at by each of the three methods; and the conclusion reached from the evidence provided by the laboratory findings—namely, that the peak of the epidemic occurred in the last week of January—appears to be reasonably accurate.

One of the aims of this investigation was the early detection of influenza, and since the first cases were confirmed four to six weeks before the disease became widespread this object appears to have been satisfactorily achieved.

Geographical Spread of Infection

Influenza virus A infections were first detected in South-east England in mid-December, in the South around the New Year, and in the South-west and Midlands towards the end of the first week of January; whilst in Wales, East Anglia, and the North cases were not confirmed till the second week of January. These observations and the figures quoted in Tables I and II suggest that the epidemic spread northwards from the South-east and South of England. This hypothesis is in general supported by an (unpublished) regional analysis of the numbers of local offices of the Ministry of National Insurance and Pensions which received excess claims for sickness benefit.

The material varied widely between areas, and in some areas lack of evidence for influenza may have been due to failure to submit specimens for examination. For example, several instances occurred where no material had been submitted from an area and positive results were obtained only after urgent requests for material had been made to the authorities concerned; and, in retrospect, it appeared likely that infection had been present in the area for many days. In some areas, also, the first specimens were not received till after the peak of sickness notifications to National Insurance offices. Clinical criteria for the diagnosis of influenza appear to vary between regions, and introduce a further source of error. It was noticed that material sent in response to a request from one authority tended to be collected immediately after the date when a notice on the subject was received by local medical officers, and also that this notice often reached the doctors in the South earlier than those in the North, so that analysis of material from this source may not have given a reliable estimate of the rate of spread of infection through the country. The proportions of material received from Service, civilian practitioners, and hospital sources varied widely between regions, again making it difficult to compare results. Therefore, whilst the figures suggest the direction and rate of spread of the epidemic, they do not provide evidence from which hard-and-fast conclusions can be drawn.

Influenza B

The total of cases of influenza B detected was small, and the figures shown in Tables I and II do not suggest that infection was widespread in any particular part of the country. Evidence of infection was obtained mainly from the South; no cases were detected in the Northern and North Midland areas, but this may be due to the relatively small numbers of specimens from these areas.

The most striking features shown by the figures are the absence of any peak and the observation of positive results throughout a period of almost eight months. Whereas in the case of influenza A there was a sharp peak, and although a much greater number of cases were detected, all the positive results occurred in a period of four months. It is interesting to notice also that cases of influenza B have been detected in three of the last four years.

Virus Isolations

Distribution and Antigenic Groups of the Virus Strains Isolated

Most of the above discussion is based on serological results. In all, 106 strains of influenza virus A were isolated, and the figures arranged by weeks and regions in Table II give a similar picture to those for sera in Table I. The aim was to provide a representative selection of strains from the various regions and at different stages of the epidemic. Several strains were obtained in each of the Registrar-General's regions, and the 106 isolations represent 62 different localities. The interval between first and last strains isolated was 13 weeks, and in most regions four or five weeks elapsed between the first and last isolations, so that it may be fairly claimed that the aims mentioned above were achieved.

In 1951 two antigenic groups of influenza A were present in the country, and exact information regarding their distribution was rather scanty. During the past winter, virus isolations were undertaken on a relatively large scale so that in the event of more than one antigenic group being present adequate material would be available for epidemiological studies. Strains of influenza viruses sent from the Public Health Laboratory Service laboratories to the World Influenza Centre have all, with one exception, been closely related to, but not identical with, the Scandinavian group strains isolated in England in 1951. The exception was one of several strains isolated from patients in the Ipswich (Suffolk) area, and was related to the Liverpool group strains, which were also present in England in 1951. A second strain of this group was isolated at the World Influenza Centre, London, from a member of their staff.

Strains of the 1953 Scandinavian group were also found this year in Japan, the U.S.A., and Western Europe, and Liverpool group strains were isolated in Paris, Switzerland, and Portugal.

Included in the figures for virus isolations were 28 specimens of lung obtained *post mortem*. Two strains each of influenza A and B were recovered from these specimens, and it is interesting to note that both the A strains were from patients in the London area who had died suddenly during the fogs of December and January respectively. Twelve other specimens of lung from patients in the same area whose death was also believed to be associated with fog were negative in virus isolation tests.

Summary

The laboratory evidence for influenza virus infections in England and Wales during the winter of 1952–3 is presented and analysed according to regions and the date of collection of specimens.

The first cases of influenza A were detected in mid-December, and the disease became epidemic at the end of January—that is, four to six weeks after the first evidence of infection was obtained.

In the country as a whole there was close agreement between estimates of the time limits of the epidemic derived from the laboratory results, the Registrar-General's weekly returns for deaths from influenzal pneumonia, and increased claims for sickness benefit received by local offices of the Ministry of National Insurance and Pensions.

The evidence suggests that the influenza A epidemic spread northwards from the south-east and south.

A few cases of influenza B infection were detected during most weeks between mid-January and mid-May, and occasional cases were detected up till August.

106 strains of influenza virus A were isolated, and these were well distributed with regard to time and place.

Information regarding the antigenic groups of influenza virus A was kindly supplied by Dr. A. Isaacs, of the World Influenza Centre, London. Figures for deaths from influenzal pneumonia are quoted from the Registrar-General's weekly returns, published in the *British Medical Journal*. The figures for local offices of the Ministry of National Insurance and Pensions were calculated from data made available by and quoted with the kind permission of Dr. A. Massey, Chief Medical Officer of the Ministry of National Insurance and Pensions.

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CENTENARY OF HYPODERMIC INJECTION

BY

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Hypodermic, or subcutaneous, injection of drugs being now so catholic, it is surprising to find that of all the common current methods of exhibition this is one of the most recently introduced. Inhalation, rectal administration, and even intravenous infusion were in use when Dr. Alexander Wood, of Edinburgh, gave the first subcutaneous injection, in the modern sense, one hundred years ago. As the present year is the centenary of that injection it may be of timely interest to recall the origins of the method and something of its author.

The modern hollow hypodermic needle and its companion, the syringe, have evolved from earlier and cruder predecessors made when man first began to inject drugs intravenously and to practise blood transfusion. So perhaps the common origin of these procedures is the best point to begin a consideration of the development of hypodermic injection.

The First Blood Transfusion

Although the ancient Egyptians may have practised it, the first really successful blood transfusion was not performed until the middle of the seventeenth century. The story of the rejuvenation of Aeson by Medea (Ovid, 43 B.C.) is interpreted by some as an indication that the notorious sorceress was acquainted with the method, and that therefore the early Greeks knew of blood transfusion. However, Ovid's description of the rejuvenation simply establishes Medea as an early pharmacologist rather than as the deviser of blood transfusion. It is difficult to be sure whether she should be regarded as the first to inject drugs into the human body, for there were no eye-witnesses—except Liber—

of the operation, which is reputed to have been done by cutting Aeson's throat and pouring "the juices," prepared from various plants and animals, into his veins. Again, it is often stated that the first transfusion was carried out on Pope Innocent VIII (1432–92); but, as Keynes (1949) has pointed out, the papal elixir was simply a draught prepared by a Jewish physician from the blood of three boys who were bled to death for the purpose—at least, they died soon after the bleeding.

Precisely when blood transfusion came into existence is still a matter of dispute, but it is certain that transfusion was preceded by infusion. The earliest attempts at intravenous injection were made in England in the middle of the seventeenth century and were soon followed by infusion of blood into animals and then into man.

Intravenous Injection

In 1657 Christopher Wren—while he was Savilian Professor of Astronomy at Oxford and before he became famous as an architect—conducted numerous experiments, with the assistance of Robert Boyle and a Dr.

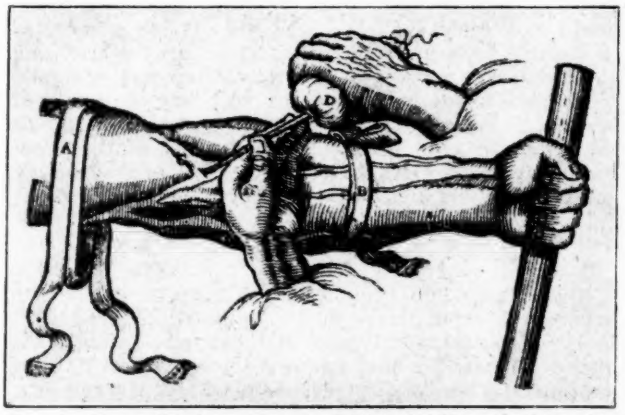

FIG. 1.—Engraving from page 2 of Major's *Chirurgia Infusoria*, Kiloni, 1667, showing his injection apparatus. (Photograph of engraving kindly supplied by Mr. W. J. Bishop, of the Wellcome Historical Medical Library.)

Wilkins, on the giving of drugs by intravenous injection (Oldenburg, 1665). Bishop Sprat (1702) said of Wren: "He was the first Author of the Noble Anatomical Experiment of Injecting Liquors into the Veins of Animals. . . . By this operation divers Creatures were immediatly purg'd, vomited, intoxicated, kill'd, or reviv'd, according to the quality of the liquor injected: Hence arose many new Eperiments [*sic*], and chiefly that of Transfusing Blood, which the Society has prosecuted in sundry Instances, that will probably end in extraordinary Success."

Wren appears to have been the first to perform an intravenous injection in man in, it is thought, 1657 (Clarck, 1668). During the injection the victim—a delinquent servant of a foreign ambassador—fainted and the experiment had to be stopped. Boyle (1664) described this experiment in a way which suggested that the foreign ambassador had performed the injection, but Clarck made it quite clear that it was Wren who did it in the house of the Duc de Bourdeaux, the French Ambassador. A few years later, in 1662, J. D. Major also performed some successful intravenous injections in man (Major, 1664).

For these early injections both of blood and of drugs, a quill, later replaced by a silver or gold tube—the "pipe"—was inserted into the vein and the injection made through it, either by using a small bladder—"like a clyster"—as a pump or by means of a gravity feed. The first injections were chiefly of water, opium, and purging medicines. Intravenous administration of jalap resins, as practised for example by Fabritius (1667), was particularly popular, especially in the treatment of syphilis.

The frequent use of opium led to the early observation that it stupefied dogs and excited cats (Boyle, 1664). But opium and narcotics were by no means the only substances injected intravenously. Fortescue-Brickdale (1904) quoted Purmann (1706) as giving a list of drugs sometimes used. It includes amber, arsenic, cinnamon, oil of sulphur, snail water, spiritus lilior convallarium, spiritus nitrosi vel vitrioli, and spiritus salis ammoniaci.

With only impure drugs and crude apparatus available, the method of intravenous infusion soon fell into disrepute, and for the remainder of the seventeenth century was carried out but sporadically. Very little more was published on the subject until near the end of the eighteenth century, when there was a temporary revival of interest, which continued well into the next century. During this period Magendie was one of those most actively interested: he attempted to treat hydrophobia with injections of opium, or sometimes even warm water (Olmsted, 1944). But little success attended him, and again, except for saline infusion, the practice seems to have been little used until later in the same century, when there was a further revival of interest about 1870. It was not, however, until the irrepressible Ehrlich showed that intravenous administration of his arsenical compounds really was a practical procedure that it became commonplace in therapeutics.

The Work of Pravaz

While the practice of intravenous injection of drugs waxed and waned in the nineteenth century a special type of intravascular administration was described. Its originator was Dr. Charles-Gabriel Pravaz (or Pravas), of the Veterinary College in Lyons, France. His method was presented to the Academy of Sciences in Paris on January 10, 1853, by M. Lallemand, a director of the College. It was published in the correspondence section of the Academy's proceedings under the title "Sur un nouveau moyen d'opérer la coagulation du sang dans les artères, applicable à la guérison des aneurismes." Pravaz injected iron perchloride "au maximum de concentration" into the vessels of sheep and horses through "un trois-quarts très-fin or ou en platine" introduced obliquely by "une espèce de mouvement de vrille." "A ce trois-quarts se trouve ajustée une seringue dont le piston doit être à pas de vis, afin que l'injection s'opère sans secousses et que la quantité de liquide injecté puisse être mesurée avec précision."

Pravaz suggested that the method might be modified to render it suitable for the treatment of aneurysms in human beings, and calculated that the injection could be made, with time allowed for clot formation, in about four to five minutes. As he designed and caused a syringe to be made for this work, the erroneous claim, such as that of Fluck (1953), is sometimes advanced that Pravaz was responsible for introducing hypodermic injections: but of this more anon. (Experiments on the coagulation of the blood had been carried out long before the time of Pravaz. For example, Bishop Sprat, in his *History of the Royal Society of London* (p. 199) says that the Society received a communication telling "of making the blood Florid with Volatil and coagulating with Acid Salts." Presumably he was referring to the work of Fracassati, who, in a communication to the Royal Society in 1667, described such experiments on dogs. Robert Boyle (1667) performed similar investigations on shed blood, and claimed that it was from these experiments that Fracassati got his ideas.)

Shortly before the work of Pravaz, in a period which coincided with the isolation of the first pure alkaloids from some of the crude drugs used earlier for intravenous injection, a new technique of administering medicinal agents had been evolved. In it the drugs were not given direct into the circulation, but were placed beneath the skin, from which site they gradually found their way into the system. And even prior to this, drugs had been administered through the skin, by the application of ointments and liniments to the epidermis, sometimes accompanied by vigorous rubbing. These methods were not very satisfactory, and neither was their extension—the direct application of drugs to the dermis, following the removal of the epidermis by blistering agents or caustics. Another method, more closely resembling the modern subcutaneous one, was described in 1836 by Lafargue in France. He smeared drug, in the form of paste, on the tip of a vaccination lancet, which was then pushed through the skin, where it remained for a short time before withdrawal. However, as the dose was obviously not determinable, and the method laborious and time-consuming, it never became popular.

Rynd's Method

From Dublin, in its heyday as a medical centre while Graves, Stokes, Adams, and Corrigan were leaders of the profession, there came a different approach to the problem of finding a more generally applicable and safer parenteral route of administration than the intravenous. Francis Rynd, surgeon to the Meath Hospital, devised a form of subcutaneous administration of drugs which has a slight claim to be the forerunner of the modern hypodermic method (Rynd, 1845). Under the title "Neuralgia—Introduction of Fluid to the Nerve," he described how, on June 3, 1844, "a solution of fifteen grains of acetate of morphia, dissolved in one drachm of creosote, was introduced to the supra-orbital nerve and along the course of the temporal, malar, and buccal nerves by four punctures of an instrument made for the purpose." He found that the pain of the neuralgia was abolished very rapidly, and that the patient, an elderly lady, had a better sleep the following night than she had had for months. He also described the case of a man aged 28, who seems to have had sciatica, successfully treated by a similar technique, although the concentration of morphine was reduced by a third. Rynd did not describe the instrument in this paper and quoted no references. It was not until a good deal later that he published an article giving details of his apparatus (Rynd, 1861), which was essentially a trocar and cannula. After insertion through the skin the trocar was made to spring back out of the cannula into the body of the instrument by pressure on the lever at the side (Fig. 2). The drug solution was then poured in through a small hole near the base of the cannula and allowed to gravitate into the subcutaneous tissues.

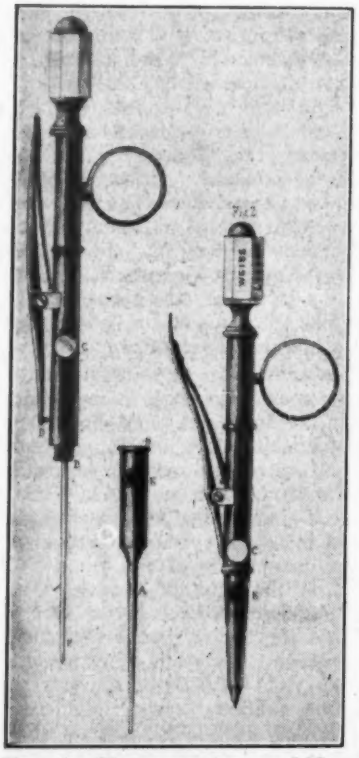

FIG. 2.—The apparatus used by Rynd (from *Dublin Quart. J. med. Sci.*, 1861, 32, 13).

In 1845 a claim was made by Arthur Guinness that on reading Rynd's article he was reminded that "it had been my intention long since to have sent you an account of some cases treated by me during last summer in a similar manner. . . . I used a common lancet armed with morphine, mixed in a little water, about the consistence of a paste and operated precisely as is done in vaccinating an infant; I did not use creosote with it. . . . In another bad case of neuralgia I determined on using creosote without morphine. . . . It was of decided benefit in my case." This technique described by Guinness was not new, for it had been employed eight years earlier by M. Lafargue, and in any case it was not the ancestor of the present-day practice of hypodermic injection.

Although Rynd's method of administering fluids has been held by some to be the beginning of modern hypodermic injection (Macht, 1916; Pfender, 1911) it is extremely hard to make a really good case for this. Rynd did employ a hollow cannula, which could be regarded as a forerunner of the hollow hypodermic needle, but he depended upon gravity to force the drug solution into the tissues. Further, he was interested only in the local pain-relieving properties of his injections and did not seem to realize that effects remote from the site of injection might be obtained. This is all the more surprising when the doses are known: "The fluid I have found most beneficial is a solution of morphia in creasote [*sic*], ten grains of the former to one drachm of the latter; six drops of this solution contain one grain of morphia, and a grain or two or more may be introduced in cases of sciatica at one operation" (Rynd, 1861). As the syringe is now an essential component of the hypodermic apparatus, Rynd's instrument was most definitely not a direct forerunner of the modern equipment.

Introduction of the Hypodermic Method

It was in 1853 that hypodermic injection as we know it to-day came into being, although the first public pronouncement about the method was postponed until 1855. In 1853 Dr. Alexander Wood, of Edinburgh, instituted the practice of injecting drug solutions through the skin, using a syringe and needle. The idea of subcutaneous administration came to him while considering a development of the special type of injection introduced by Pravaz for the treatment of aneurysm. Thus, subcutaneous injection really grew out of earlier intravascular practice. Wood wrote: "Having occasion, however, about the end of 1853, to endeavour to remove a naevus by injection with the acid solution of perchloride of iron, I procured one of the elegant little syringes, constructed for this purpose by Mr. Ferguson of Giltspur Street, London. While using this instrument for the naevus, it occurred to me that it might supply the means of bringing some narcotic to bear more directly than I had hitherto been able to accomplish on the affected nerve in neuralgia. I resolved to make the attempt, and did not long lack the opportunity."

An elderly lady who had suffered for a long time from cervico-brachial neuralgia—and who, incidentally, could not take opium in any form by mouth without being violently sick—was the patient who afforded Wood his desired chance. "Accordingly, on November 28th, I visited her at 10 p.m. to give the opiate the benefit of the night. . . . I inserted the syringe within the angle formed by the clavicle and acromion, and injected twenty drops of a solution of muriate of morphia, of a strength about double that of the officinal preparation."

Wood (1855) published this description of the first hypodermic injection in the modern sense under the title "New Method of Treating Neuralgia by the direct application of Opiates to the Painful Points." To the twenty-sixth Annual Meeting of the B.M.A., held in Edinburgh in July, 1858, he stated that the solution injected was "made of morphia in sherry wine, because I thought it would not irritate and smart so much as alcohol, and because it would not rust the instrument as a water solution of opium would do" (Wood, 1858). (Incidentally in this address Wood said

that his first injection was given in November, 1843, not 1853, and Howard-Jones (1947) doubted that this was a genuine mistake. If accepted it would, of course, give Wood's method priority over that of Rynd.)

Wood injected a solution "of a strength about double that of the officinal preparation." Whether there was any difference between the officinal and official preparations is not certain. This was in the days when the colleges issued their own pharmacopoeias, and it is more than likely that Wood used the then current Edinburgh issue of 1841. In it the Morphiae Muriatis Solutio is prepared by dissolving ʒ iss muriate of morphia in a mixture of 5 fluid ounces of rectified spirit and 15 ounces of distilled water. It therefore contained 1 gr. (65 mg.) of morphine muriate in 106 minims (6.4 ml.) of solution. So, if Wood injected twenty drops of a solution about double this strength, he gave a dose of about ⅔ gr. (26 mg.) of morphine hydrochloride.

Although Wood, like Rynd, was interested mainly in the relief of pain in the neighbourhood of the injection, he realized that general effects were important too. His conclusions indicate this quite clearly :

"1st, That narcotics injected into the neighbourhead [*sic*] of the painful point of a nerve affected with neuralgia, will diminish the sensibility of that nerve, and in proportion diminish or remove pain.

"2d, That the effects of narcotics so applied are not confined to their local action, but that they reach the brain through the venous circulation, and there produce their remote effects.

"3d, That in all probability what is true in regard to narcotics would be found to be equally true in regard to other classes of remedies.

"4th, That the small syringe affords a safe, easy, and almost painless method of exhibition.

"5th, That, destitute as we are of any precise experiments as to the applicability of cellular tissue as a medium for the reception of medicinal agents, the experiments made with the syringe show that it seems to offer an excellent surface for the absorbent action of the venous system."

FIG. 3.—Dr. Alexander Wood's syringe (by courtesy of Mr. J. N. J. Hartley, Curator of the Museum of the Royal College of Surgeons of Edinburgh). Since this photograph was taken the syringe has suffered further damage and the barrel is now shorter than shown here.

These passages make it quite obvious that Wood realized the general applicability of his method. But in spite of this he was mostly concerned with injections at the seat of the pain, although he believed that both a local anaesthetic effect and the general narcotic action of morphine were of value in the treatment of neuralgia.

The syringe which Wood used is well known and is preserved in the Museum of the Royal College of Surgeons of Edinburgh. There is no trace of the needle (J. N. J. Hartley, personal communication, 1952).

Wood's Syringe and Method of Injection

Comrie (1927) described Wood's syringe thus : "The syringe is 90 mm. in length, and the barrel, which has been broken towards its base, is 10 mm. in diameter. The piston is wrapped round at its extremity with cotton wick to make the plunger fit the barrel. At its apex the barrel is drawn into a conoidal extremity which fits a metal nose cap. The cap is of curious construction and consists of one inner filler-shaped part which fits closely to the diminishing portion of the glass barrel and ends in a pointed extremity, which is threaded externally, to allow a hypodermic needle to be screwed on. The filler-part is grasped by a metal arrangement, whose apex is tightly applied to it at the screw. It is prolonged upwards by two lateral metal strips, bound by a circle round the middle of the inner cap, and prolonged upwards further by the two lateral bands, to end in a ring, which does not touch the barrel, and may have been used to steady the syringe and prevent the metal cap being forced off during administration of a hypodermic injection."

It is surprising that Wood did not describe the needle, for it is such an important part of the equipment, and differed from anything before it in being attached to the syringe to form a composite instrument. Far from describing the needle, he wrote, in his 1855 article, about inserting the syringe. However, his biographer, the Rev. Thomas Brown, who married Wood's sister, stated that the design was based on the sting of the bee (Brown, 1886). This information was probably obtained from Wood's description of the type of syringe he was using in 1858, one which had been improved by the addition of graduations to the barrel. "The instrument is of the simplest construction and is a modification of Mr. Ferguson's, already alluded to. It consists of a small glass syringe graduated like a drop measure, and to this is attached a small needle, hollow, and having an aperture near the point like the sting of a wasp" (Wood, 1858). These scant statements appear to be the only information about the actual needle used by Wood. The needle is probably more correctly compared to the sting of a wasp than to that of a bee, because of the barbs on the latter. The photograph of the syringe shows that the nozzle was adapted for the application of some kind of needle which screwed on to the metallic male end of the apparatus.

Wood's method of injection was taken up by others in many countries only after his 1858 paper. At first, however, all adhered to the principle of injecting the pain-relieving drug into or near the site of the pain. The demonstration, that to relieve pain the injection of morphine did not have to be at the sore place, was due to a London surgeon, Charles Hunter. He pointed out that repeated injection into "an unsound or morbidly sensitive part" increased the tendency to sepsis, and was accompanied by great pain during the actual injection (Hunter, 1859). He maintained "that, by the introduction of narcotics into the cellular membrane of the body, we have a mode of attacking and subduing cerebral excitability more rapid, more certain, and more pure in its action, than by stomachic doses of narcotics." Hunter described the needle he used, and gave an illustration of it (Fig. 4). The "pipe," as he called it, was

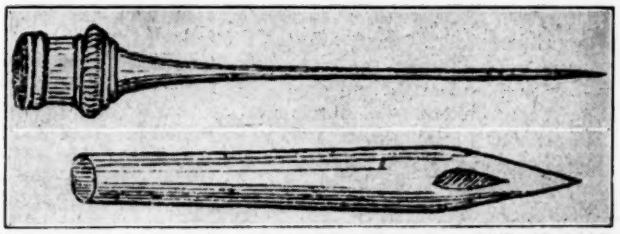

FIG. 4.—Hunter's needle. (From *Med. Tms Gaz.*, 1859, **19**, 354.)

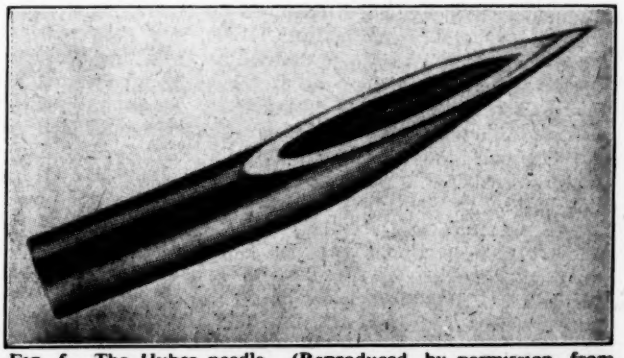

FIG. 5.—The Huber needle. (Reproduced, by permission, from the article by Dr. O. Schwidetzky in *Medical Physics*, vol. 2, edited by Dr. O. Glasser, Year Book Publishers Inc.)

made of silver with a hardened gold point. He had two pipes, the smaller of which was about 1¼ in. (3 cm.) long and about 25 or 26 S.W.G. Each pipe was pointed "like a needle," tapering from all angles as does a pencil point, and occupying a place between the usual hypodermic needle of to-day with its bevelled end and the Huber needle (Fig. 5). Hunter went on to use drugs other than morphine and to develop the grandiose idea of a "hypodermic treatment of disease."

Biographical Notes on Dr. Wood

Dr. Alexander Wood, who undoubtedly deserves the credit for the introduction of the hypodermic method, was born at Cupar, Fife, on December 10, 1817. He belonged to a family distinguished medically, and his ancestry has been traced to a Dr. Alexander Wood, "who in 1682 married the daughter and heiress of Jasper Johnston of Warriston and Curriehill" (Brown, 1886). The Alexander Wood of hypodermic fame is often called Secundus to distinguish him from his grand-uncle, an earlier Dr. Alexander Wood (1725–1807), familiarly known as Lang Sandy. Educated at adventure schools until 1826, Wood Secundus then went to Edinburgh Academy, opened two years earlier. Entering Edinburgh University in July, 1832, he took the usual Arts course at the same time as he followed the medical curriculum. One of the great men who had a profound effect on Wood at the university was Dr. (later Sir Robert) Christison. Wood was a member of the Royal Medical Society, which he served as Junior President from 1837 to 1839. He graduated on August 1, 1839. In 1840 he was elected F.R.C.P.Ed., and in 1841 was appointed Lecturer in the Practice of Medicine at the extramural school.

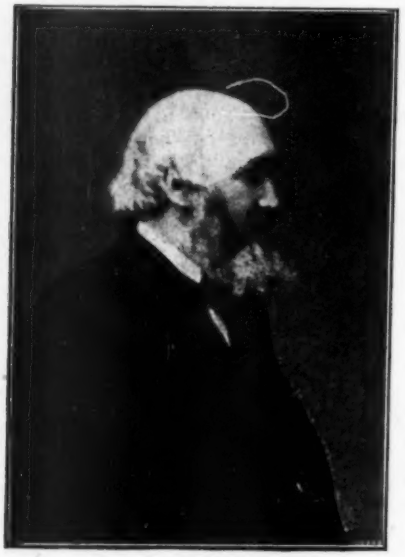

FIG. 6.—Dr. Alexander Wood as an elderly man. (From *Dr. Alexander Wood, M.D.*, by Rev. Thos. Brown, Edinburgh, 1886.)

His first published paper was on poisoning with corrosive sublimate (1839); this was followed by others on homoeopathy (1844, 1845), mesmerism (1851), and subcutaneous injection (1855). In 1842 he married an Irish lady, Rebecca Massey, of Tipperary; so far as I have been able to find, they had no children. He took a lively interest in medical politics, and was a representative of Scottish medicine on the General Medical Council in London. Elected sixty-seventh President of the Royal College of Physicians of Edinburgh, he remained in this coveted position from December, 1858, to December, 1861. He was a formidable debater at professional meetings, but was very gentle and kind as a teacher in the Sabbath School. His religious habits are certainly not in keeping with the suggestion that he purposely instituted, or knowingly allowed to continue, the false impression that his first subcutaneous injection was performed in 1843 and not 1853. He died on February 26, 1884.

Terminology

When Wood introduced the method of injecting drugs below the skin he called it the "subcutaneous" route. When Charles Hunter, as already described, extended the applications of the method he introduced the term "hypodermic." Hunter's reason for giving a new name to his method, which really only withdrew the emphasis from the local action, was, no doubt, that he wanted his "remote" injections to be regarded as something completely new and different from the locally acting injections of Wood and Rynd. Wood and Hunter carried out a long correspondence in the *Medical Times and Gazette* on the subject of who was the first to recognize the remote effects following an injection (for references, see Howard-Jones, 1947).

The names applied to the injection of fluids under the skin are interesting. Called by Wood "subcutaneous" after the Latin—the word being in use before Wood's time—it was dubbed "upodermic" by Hunter in his first paper on the subject. Upodermic was used because it was of Greek origin and therefore similar to the terms endermic and enepidermic, which were fairly common at that time. In his second paper Hunter used the term "hypodermic," adding a footnote, "In the first part of this paper the word hypodermic was spelt upodermic: but I now spell the word in accordance with common orthography." The most likely reason for Hunter's adoption of the form "upo" is that he did not realize the significance of the rough breathing mark in ὑπό. Perhaps some colleague with a better classical education pointed out the error in time for it to be changed in the second paper.

It is doubtful if Hunter was right in his choice of name, although he was justified because of the existing words from the same root. The name is derived from δερματικός, not δέρμα: the stem is *dermat*, as in dermatitis and dermatologist. Hence hypodermatic would be more correct than hypodermic. Hypodermic, however, is sanctioned by long usage and has the advantage of being the shorter form.

Early Forms of Hypodermic Syringe

The Ferguson syringe used by Wood is undoubtedly the forerunner of the modern "hypodermic," although there have been some modifications since it was first used for subcutaneous injection. The needle screwed on to Wood's syringe, and the glass piston, wrapped in cotton-wool or gauze to reduce leaks, was operated by a push-pull action. When hypodermic injection became popular on the continent of Europe, the syringes used were at first based on that which Pravaz had employed for injecting clotting agents into aneurysms. These differed from the Ferguson–Wood type, for the syringe was of metal and the piston was operated by a screw mechanism. The mode of use was also different: with the Pravaz type of syringe, which Béhier popularized in France for subcutaneous injections, a trocar and cannula were inserted through the skin; the trocar was withdrawn and the syringe screwed on to the cannula, which remained in position until the injection was completed.

This method was obviously cumbersome and it was impossible to avoid the injection of air. Besides, when injecting aneurysms, clotting was apt to occur when blood and sclerosing fluid met in the cannula and, when this happened, to cause a leak back past the piston. As most syringes were of silver the leak could not be seen; so, to obviate the difficulty thus caused, Lenoir had a glass barrel made for his syringe. He also introduced the use of a fine second cannula. This was attached to the syringe, charged with fluid, and inserted through the wider first cannula, already placed in position in the tissues. Lenoir's work is well reported in the *Association Medical Journal* (Report, 1853), but even when his modifications were adopted for subcutaneous injections the method remained complicated and was totally unlike present-day practice. In Wood's

technique, however, as in the modern hypodermic method, perforation of the skin was effected with the penetrating needle already attached to the syringe.

Advances in Design

The screw piston remained on Continental syringes until H. Wulfing Luer, a Parisian surgical instrument maker, introduced a metal-and-glass instrument which dispensed with the screw piston and adopted the push-pull mechanism of the Wood apparatus. Luer also rejected the screw mount for the needle, and in this respect set the fashion for the hypodermic syringe as we know it to-day. He did not adopt Wood's addition of graduations to the syringe barrel, but marked the piston-rod instead. Although his syringe had a push-pull mechanism there was a movable stop which traversed a thread along the piston shaft. By setting this stop before injection the dose to be delivered was fixed and could not be exceeded without further manipulation. A similar running stop is still to be found on some present-day syringes.

The next advance in syringes came about 1896, when Luer introduced an all-glass model (Schwidetzky, 1952). Schwidetzky also stated that the first of the familiar Record syringes was made in 1906 by the German firm of Dewitt and Hertz. Though the Record mount is probably the most widely used in this country to-day, it seems likely that it will ultimately be replaced by the Luer mount, which is much sturdier. The British Standards Institution has, in its specification BS 1263 of 1946, adopted the Luer mount for all-glass as well as metal-and-glass hypodermic syringes for general use. It is probable, therefore, that the standard for hypodermic needles will, when published, also specify the Luer fitting. It is to be hoped that, when this standard is drawn up, a rational orismological system will be advised and adopted. Such a system would improve upon the present habit of the use of manufacturers' code numbers, which often combine gauge and length of needle: in a pithy form it should give details of length of needle and gauge of cannula, type of point, and size of mount, with, if possible (but not so essential) the wall-thickness of the cannula. (There have, of course, been many other modifications to the hypodermic syringe, such as the use of rubber or leather washers on the piston; hollow pistons to contain needles or drugs; permanently fixed needles protected by covers, which could also be used to prepare injection solutions, and so on. But these are mostly side branches of the genealogical tree of the modern hypodermic syringe, and so have not been described.)

Future Development

It is difficult to foresee the future development of the syringe and needle, quite apart from the many special types which have been developed and which will no doubt be made for particular purposes, but it is interesting to speculate. Is it likely, for example, that the orthodox equipment will be replaced by the "cartridge" syringe, already familiar to dentists and of which only the needle has to be sterilized? Or will there be a return to their wartime popularity of those extremely handy, single-dose, collapsible tubes with covered, sterilized needles already attached? Or will the hypospray technique, described by Figge (1947) and Hingson and Hughes (1947), supplant the older methods? Will the many disadvantages of this new method, such as expense, limited dosage, frequent tissue injury, and complicated maintenance be offset by its simplification of the steps necessary for sterility and its ability to overcome the fear of the needle? Is it likely that Wood's lost needle will be permanently abolished by the wide acceptance of jet injection, which is only radical departure from the method used by Dr. Alexander Wood one hundred years ago?

At any rate, it is certain that, to oust Wood's time-tested simple, accurate, and flexible injection technique from its place of universal popularity, any new method will need to possess merit indeed.

Conclusion

It seems reasonable that, although no one individual was entirely responsible for the introduction of the method of injecting drugs into the subcutaneous tissues, Dr. Alexander Wood should be granted the major share of the credit. There is no doubt that drugs were inserted below the skin before his time, but Wood's method of injecting is the one we use to-day. True, Wood was obsessed with the idea of local action, and credit must go to Charles Hunter for turning the general systemic effects after hypodermic injection to good account. But Hunter used Wood's subcutaneous method and, calling it by its equivalent Greek name, merely extended its applicability.

So Wood, availing himself of an instrument which had been evolved for intravascular administration, performed the first subcutaneous injection shortly after 10 p.m. on November 28, 1853. He introduced the method "quietly and unobtrusively" (except for some bickering with Hunter over the question of who was the first to make use of the remote effects) and "left it to make its own way" (Brown, 1886). He made no fortune from his invention and gained little fame, for, although the method is in daily use by almost every practitioner, how many know the name of the man to whom the medical profession, and indeed mankind in general, is indebted for its introduction?

I am grateful to Dr. E. Ashworth Underwood, of the Wellcome Historical Medical Museum, for drawing my attention to the very complete historical survey of hypodermic medication by Dr. N. Howard-Jones, from which a lot of my information has been obtained. A further interesting and detailed account of the history of injection—intravenous, subcutaneous, and intramuscular—is contained in the centenary number of the *Ciba Zeitschrift* (March, 1946), which is entirely devoted to Die Injektion. I would like to thank Professor W. A. Bain for many stimulating discussions and for editorial criticism, though he has forbidden me to do so. Mr. C. N. England prepared all the photographs except Figs. 1 and 3.

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ATTEMPTED SUICIDE IN OLD AGE

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Suicide and the mental disorders of old people are two of the foremost social and psychiatric problems of today. Though the incidence and types of mental disorder occurring in old people have recently attracted much attention, and the rise of the suicide rate with advancing age has long been recognized, few clinical studies of suicide or suicidal attempts in this age group of the population have been reported. This is the more surprising since, as the proportion of old people in the community rises, the suicide rate may for that reason also rise. It is striking, for example, to find in a recent authoritative study of the mental disorders in later life (Kaplan, 1945) only brief reference to suicide, and no elaboration of its clinical aspects.

Gruhle (1941) is often quoted in an opinion which minimizes the importance of psychoses in the genesis of suicidal acts in this age group and emphasizes, as motives, morbid reactions to physical illness and mental incapacity, idleness, boredom, loneliness, and inadaptability in changed circumstances.

Swinscow (1951) in a valuable statistical investigation has come to the conclusion that "suicide in the last 50 years has increasingly become a disorder of elderly people," and has suggested that, "as the present century has advanced, the old may have found their environment more hostile than the young."

Kiørboe (1951) has made a study of 14 old people who committed and 21 who attempted suicide. His condensed findings cannot be abstracted briefly. All his cases were residents in an institution, and his sample is therefore not representative of the community at risk. His conclusions differ materially from those of this paper —for example, he reported in his group a high incidence of syphilis, and found alcoholism to be an important factor and loneliness rare as a motive for suicide.

Roth and Morrissey (1952), from a study of 150 patients over the age of 60 admitted to a mental hospital and a review of the literature, suggest a special association between old age and depressive illness, and support their opinion of the importance of the affective psychoses in this age group by reference to suicide rates. They report that only 12 of their 150 patients had made attempts at suicide, and that each of these was suffering from an endogenous depression. They are critical of Gruhle's opinions, and state that "it is not argued that social factors play no part, but that it is through their role in the precipitation of depressive psychoses that they contribute to the causation of suicide in the old." It seems possible, however, that the factors noted by Gruhle may act not merely as precipitants of depressive psychoses but more intimately in affecting their course and outcome.

There is obviously a need for further studies. Social and psychiatric data must be accumulated, from a sufficient number of cases, at different centres.

General Characteristics of the Cases

In a series of 200 consecutive cases of attempted suicide admitted to a general hospital in the years 1950–2 and personally observed, 40 (20%) were aged 60 years or over. These 40 cases have been studied in detail. The sample is small, but it is likely that it is reasonably representative of an urban population. The large majority of all suicidal attempts occurring in the city of Edinburgh are admitted to this hospital: suicidal attempts in old people usually demand active surgical and medical treatment, and there is naturally a great reluctance to commit an old person directly, as an emergency, to a mental hospital.

The sex, ages, and marital state of these 40 people are detailed in Table I.

TABLE I

Age Group	Male	Female	Total	Marital State	Male	Female	Total
60–64 years	5	4	9	Single ..	3	10	13
65–69 ,,	5	11	16	Married ..	7	3	10
70–74 ,,	4	6	10	Widow(er)	4	10	14
75–79 ,,	—	2	2	Separated ..	2	1	3
80–84 ,,	2	1	3	Divorced ..	—	—	—
Total ..	16	24	40	Total ..	16	24	40

Family Histories

In 26 (65%) of the cases there was a family history of psychiatric abnormalities, which were manifested in 54 of their relatives; 7 (17%) of the cases gave a family history of suicide, seven of their relatives having attempted suicide, five successfully. In 14 (35%) cases a history of mental illness in first-degree relatives was obtained. In 12 of these 14, affected relatives had suffered from severe depressive breakdowns: in 6 of the 12 the history was indubitably of manic-depressive psychoses.

Previous Personal Histories

One-half of this group of people (male 11, female 9) had experienced a "broken home" in their childhood. This high proportion corresponds to that found in a large series of cases of attempted suicide of various ages (Batchelor and Napier, 1953).

More than one-half of the cases (male 9, female 13) had been mentally ill before the present breakdown. Less than one-quarter (male 6, female 3) had previously received psychiatric treatment. The large majority of the previous illnesses had been depressive in character.

Seven individuals (male 5, female 2) had made a previous suicidal attempt. Three of these attempts occurred in an earlier phase of the present illness.

One-quarter of the group were considered to have adequate personalities. The remaining three-quarters seemed vulnerable. Most common factors were a morbid sensitivity and shy seclusiveness which had developed in some instances into jealousy, suspicion, and ideas of reference; and anxious, timid, obsessional dispositions with a tendency to hypochondriasis. A number showed undue dependency of long standing, and passive homosexual trends. The majority had restricted interests.

The intelligences of the group seemed to parallel those of an average sample of the population of the same age.

The great majority of these people had satisfactory work records; but their limiting personality traits, in the cases where frank failures in social adaptation had not occurred, had led usually to no better than fragile adjustments. Social adaptation had been defective in one-half of all the cases. Most of these people had had few friends: self-centred and prickly, they were disposed to loneliness. Only 7 (male 6, female 1) had a present affiliation to any organized non-religious group. Four of these seven individuals, all men, were members of clubs for old people.

Statistical researches seem to show that religious beliefs play some part in determining the incidence of suicide. Nothing definite in this direction emerged from the present investigation, so the data may be stated briefly. Of the group, 38 were Protestants (one British Israelite and one

Plymouth Brother included); 2 were Roman Catholics. Almost all expressed a belief in a personal God, while none denied His existence. The majority also believed in some sort of immortality or after-life; but 6 individuals (5 men) stated frankly their disbelief. Only 12 of the Protestants (9 women) were church-going; one of the Catholics had lapsed. These older people were on the whole more religious than younger suicidal individuals who were examined. But no evidence was found that their religious beliefs had played any significant part in hindering their suicidal attempts: not one of these people had consulted a minister in his perplexity or was inhibited by fear of punishment beyond the grave.

One-quarter of the group stated that they did not know that attempted suicide was an offence against the law; while only those whose previous attempts had brought them to police notice knew what precise action the law might take. No evidence was found to show that legal sanctions had acted as a deterrent.

Social Data

Table II gives an analysis of the social conditions of the group. One-quarter had suffered a fall in social status over their lives, which could probably be correlated with their personality defects. Only one individual had suffered any great change (decline) in social status over the past twelve months. Only three had experienced a significant change in their living conditions in the past twelve months. Apart from the three living a communal life in lodging-house or hostel, one individual suffered from overcrowding and three others lacked privacy at home.

TABLE II

	Male	Female	Total
(A) *Present Social Class:*			
I. Professional		3	3
II. Intermediate between I and III	2	3	5
III. Skilled workers	5	9	14
IV. Intermediate between III and V	2	5	7
V. Unskilled workers	7	4	11
(B) *Present Employment Status:*			
Employed (including domestic duties)	2	16	18
Retired	10	1	11
Unemployed, but fit (not retired)	2	1	3
„ because unfit	2	6	8
(C) *Financial State:*			
Adequate	10	21	31
Financial stress	4	2	6
Subsistence level	1	—	1
Below subsistence level	1	1	2
(D) *Housing and Living Conditions:*			
Slum	2	3	5
Artisan	11	5	16
Middle-income group	3	16	19
Living with offspring	4	7	11
„ „ spouse	6	3	9
„ „ sibling	—	7	7
„ „ other relative, friend, employer	2	2	4
Living in lodging-house or hostel	2	1	3
„ alone	2	4	6

(E) *Social Circulation and Mobility.*—Of the group 38 were Scottish; 12 were rural bred; the majority had spent many years in Edinburgh. In the past twelve months only 5 had changed the locality they lived in, and all these moves were local ones in the city. As one might expect, social mobility was not high in this group: old people prefer to be stationary.

(F) *Group Membership.*—Details of religious and other group affiliations have been given under the heading of "Previous Personal Histories."

Psychiatric Diagnoses and Symptoms

Cases of attempted suicide in this age group are more easily classified than those occurring in people in the first half of life. The persons here are usually definitely mentally ill: at least two-thirds are certifiable as insane, and the personalities of the majority are clearly involved to a psychotic extent.

In younger age groups a heterogeneous collection of reaction types is found among cases of attempted suicide; and there is a considerable proportion of persons suffering from psychopathic states and of temperamentally unstable people allied to these in their reactions, whose precise psychiatric classification is difficult and debatable. But, in old people, clear-cut depressive states comprise the setting in which the great majority (80% in this series) of suicidal attempts occur.

About one-half of the cases of depression in this series were first attacks (Table III). Ten patients had suffered from one previous attack of depression, three from two, two from three, one from four, and one from more than four previous attacks. Only one of these 17 patients had previously

TABLE III

	Male	Female	Total
Depressive state:			
(*a*) First attack	7 } 14	8 } 18	15 } 32
(*b*) Previous attack(s)	7 }	10 }	17 }
Psychopathic state	2	1	3
Cerebral arteriosclerosis	—	2	2
Senile dementia	—	1	1
Tabo-paresis	—	1	1
Paranoid state	—	1	1
Total	16	24	40

attempted suicide. This suggests that the recurrence of a depressive reaction in old age tends to be less well tolerated than earlier attacks: understandably so, since the resilience of the old person is impaired, relapse has added its quota of disappointment, and hope for the future is less native.

Only four individuals (10%) suffered from organic reaction types. In each of them the dementing process had not advanced far. These findings are in accordance with expectation, since retention of affect and volition are prerequisites for the genesis of a suicidal act. The depressive affect was prominent also in each of these four cases: one had had a depressive illness, and another had attempted suicide, some years previously.

The symptoms which precede suicidal attempts in old people are symptoms which frequently precede suicidal attempts at other ages, and are the common features also of depressive states which may not proceed to suicide. Depression and insomnia are almost always present. The depression is usually accompanied by anxiety and agitation; there is usually little or no retardation, and the depression may even be masked by a smiling exterior. Insomnia is usually persistent and accompanied by great concern: "It was the want of sleep that was troubling me"; "I haven't slept for four months"—are typical protestations.

Loss of appetite and hypochondriacal complaints about the alimentary tract are common, and the individual may be exclusively preoccupied with them. Complaints of indigestion, flatulence, and intractable constipation may have more or less justification owing to the decreased physiological efficiency of the old person's body, but they often become morbidly dominating and have delusional force: "It's as if I was going to burst"; "I can't expel anything." Such hypochondriacal delusions may be accompanied by other nihilistic delusions—for example, of poverty. Ideas of reference are not uncommon, and a few cases had unsystematized paranoid delusions.

Feelings of weight upon and tension in the head, and head noises, are commonly the bases of fears of insanity. The patient may complain of a feeling of something about to snap in his head, or the feelings may be expressed in more bizarre terms: "It is as if my brains were turning upside down"; "Whiles you'd think there was cold water in it [head]." Only one individual attempted suicide at the command of auditory hallucinations.

A few patients who were fully orientated complained of being "mixed" or "muddled up." Three others of those suffering from depressions were transiently confused (for a few days) after their suicidal attempts and disorientated in time and place: in at least one of these cases the confusion

had also shortly preceded the suicidal attempt. In none of these cases was there evidence of drug intoxication or vitamin deficiency, nor, either at the time or later, were there symptoms of cerebral arteriosclerosis. None of them had an amnesia for the suicidal act. It seems possible that the intense, agitated preoccupation with the wish for death had caused a temporary clouding of consciousness, with neglect of the material environment. The term "catastrophic reaction" appears particularly applicable. The confusion in these cases cleared, to unmask a profound depression and intact faculties.

Indications that the inner tension was becoming intolerable to the individual were commonly present before the self-injury was inflicted. Twelve patients (6 men and 6 women) made direct suicidal threats in the present illness; 6 other women made suicidal threats by implication.

Physical State

The physical condition was unsatisfactory in 24 (60%) of the cases: 8 individuals were suffering from cardiovascular disease, 5 were disabled by arthritis, 4 had organic diseases of the nervous system, 3 affections of the alimentary system, 2 of the respiratory. One woman was suffering from mild bromide intoxication.

Serious defects in vision and hearing were found in 4 cases. Malnutrition and loss of weight were common; but in no case was malnutrition accompanied by clinical evidence of vitamin deficiency. Fatigue was almost constantly present.

The Suicidal Attempt

Old people seem to show a greater preference for active methods of suicide than do younger people. They can rarely give an adequate reason for their choice: the usual reply to questioning about this is, "I don't know." The figures given below show, however, that more than one-half of this series chose poisoning. In this age group, as in others, availability of method plays some part. It is interesting to note that all of Kiørboe's institutional patients used violent methods in their attempts.

Impulsive suicidal attempts in old people are much less common than in younger age groups. Less than one-quarter of the attempts in this series seemed to have been impulsive. More than one-quarter of them had been contemplated for weeks or months.

Four of the poisonings were multiple; these have been listed under the main toxic agent (Table IV). One man cut both throat and wrist.

TABLE IV

	Male	Female	Total
Passive:			
Poisoning	7	18	25
Barbiturate	4	11	15
Coal gas	1	4	5
Aspirin	1	1	2
Lysol	1	1	2
Ammonia	—	1	1
Active:			
Cutting	6	1	7
Throat	5	1	6
Wrist	1	—	1
Drowning	—	3	3
Jumping	1	1	2
Hanging, strangulation	1	1	2
Shooting	1	—	1

The attitude of the patients after their suicidal attempts is shown in Table V.

TABLE V

	Male	Female	Total
Suicidal intention admitted immediately	9	16	25
" " denied; later admitted	4	4	8
" " denied	3	2	5
Amnesia claimed	—	1	1
Not known	—	1	1

There is rarely any doubt that the suicidal attempt of an old person has been a genuine one. Those who deny their suicidal intentions usually admit to having had feelings of hopelessness. The denial may be paradoxical: one man who had come into hospital asking to be kept safe from his suicidal urges, later, when admitted after taking 100 aspirins, denied his suicidal intentions; a woman said, "I have a confession to make to you, I *didn't* attempt to take my life."

Of the 40 cases, 22 (55%) had to be admitted for further treatment to a mental hospital—almost twice the percentage immediately requiring such treatment in a series of cases of suicidal attempts in adults of all ages.

Precipitating Factors and Motives

The diagnosis of an abnormal type of mental reaction in the individual concerned is not a sufficient explanation of a suicidal attempt. While it is probably true that more suicidal acts in old age can be more nearly explained in terms of mental illness than is the case in younger age groups, the question immediately arises: Why is it the minority of the sufferers from these illnesses who are driven to suicide? There is no mental illness, in any age group, the majority of whose victims make suicidal attempts. A case history may be briefly quoted here.

A retired public servant aged 72, none of whose near relatives had been mentally affected and who had never himself previously had a nervous illness, whose personality had been robust and work record exemplary, was bereaved of his spouse. Shortly afterwards his only son married and brought a young and aggressive wife into the house. In this setting the old man became deeply depressed in his spirits, took alcohol in excess for the first time in his life, committed, while sober, his first police offence by shoplifting, and, when partly under the influence of alcohol, made a determined suicidal attempt. There was no organic mental deterioration.

The depressive reaction in this case apparently released three distinct kinds of abnormal conduct. Even if we suppose it to have been the essential condition for the development of the deviant behaviour, the different deviations cannot conclusively be given the same, even if it is an attractively simple, explanation. We cannot be content with the finding that the depressive psychosis has been the main item in the aetiology of this suicidal act.

In old people as in all other age groups, the aetiology of suicide and suicidal attempts is multiple. So far as we know, there are no aetiological factors, either personal or social, which are peculiar to any one age group. But in the case of old people certain personal factors are more commonly, and others less commonly, encountered than they are at other ages. Among suicidal old people feelings of loneliness and of increasing physical incapacity are very often found: dramatic gestures, demonstrations of omnipotence, and reactions of escape from social embarrassments are uncommon, and intoxication is less often a complication.

Loneliness.—Feelings of loneliness, of being a burden on others, or of being unwanted, found in 23 of the 40 cases, were the commonest psychological precursors of suicidal attempts in this series. Frequently the old person states that it was a feeling of estrangement which most powerfully prompted his act: "I felt as if nobody wanted me"; "I just stay myself, I feel lonely"; "I felt I was keeping my daughter back." The same sentiments are commonly expressed in suicide notes.

Social integration is a concept which is difficult to define, and which cannot be expressed satisfactorily merely by stating the living conditions. It is obvious that an individual who is living alone may not be lonely; while a member of a family group may feel isolated. Social integration exists where there is a reciprocal sympathy between the individual and his social environment: loneliness is a sensitive indicator of its deficiency. The domestic background of the cases of this series in which loneliness seemed an important factor is interesting and, though the numbers which may be quoted are too small to be dependable, they are probably significant. Loneliness was a factor in 10 of 11 of those

living with offspring, in 8 of 8 living alone or in a lodging-house, in 3 of 7 living with a sibling, and 0 out of 9 living with a spouse.

It is recognized that the incidence of suicide in an urban area may be correlated with the percentage of those in the community living alone (Cavan, 1928; Sainsbury, 1951). The above figures may be held to confirm this to some extent; but they also emphasize that the old person may be nominally integrated by being a member of a family group and yet feel socially isolated. There is a suggestion in these figures that to be with coevals is for the old person easier than to have to adjust to the pace of life and interests of younger people. And it was clear that, in certain cases, to the loneliness in some measure inseparable from old age itself there had been added the bitter experience of emotional rejection by the children who resentfully were materially supporting and housing the old person.

Physical Incapacity.—This was a major factor in 18 cases. It was not the degree of disability which seemed usually the important element, but the rapidity of its onset or its unexpected nature. The ageing individual, with limited assets, may have to meet abruptly a new and disturbing situation. A fall, producing only bruises and shock, or increased demands upon energy and resourcefulness owing to the illness of a helpmate, may bring the old person to a sudden realization of his frailty. Forced by ill-health to keep to the house or to take temporarily to bed, he may see in this a threat of permanent invalidism and helplessness, and decide that such a future would be intolerable. Many patients after their suicidal attempts reported such reactions: "I was beginning to feel my age"; "I felt I was done"; "Lying in bed for a fortnight upset things; I was accustomed to a hard life all my days." Physical pain and discomfort strengthened the suicidal urge in 8 cases. Increasing blindness was a leading cause of suicide in one case. Three individuals were severely deaf: though they did not make their deafness a major complaint, it must have contributed to their social isolation.

Fears.—Closely allied to the above and found also in 18 cases, based usually on a misinterpretation of somatic symptoms, are fears of having contracted a fatal physical illness or of becoming insane. The physical illnesses most commonly the foci of phobias were cancer and heart disease; phobias of tuberculosis and of venereal disease were also encountered. Eight patients feared insanity, and in three of these cases the suicidal act was precipitated by arrangements being made for mental hospital admission. Perhaps the most potent fear of all is the dread which is nameless and unfocused, and from which the patient sometimes comes seeking protection saying that he feels that something terrible, he knows not what, is about to happen.

Identification with a Dead Person.—In suicides of all ages, identification with, or the hope of rejoining, a dead person is a prominent motive: it was found in 11 cases in this series—about the same percentage of cases as in a larger group of adults of all ages (Table VI). In younger people the dead individual most commonly identified with is the mother; in old people it is the spouse.

TABLE VI

	Male	Female	Total
Identification with spouse ..	2	4	6
" " sibling ..	1	1	2
" " father ..	1	—	1
" " mother ..	—	1	1
" " offspring ..	—	1	1

Financial Anxieties.—These played a part in the suicidal attempts of 6 individuals (3 men and 3 women).

Hate.—Hatred of another person, an important and striking motive in many of the suicidal attempts of younger people, is a less common element in the suicidal attempts of old people—unless one is to presume its presence in all those who are living with relatives and are to some degree estranged from them. At any rate, if it is commonly present as a motive in old people it is usually less obvious and less intensely focused. Few suicidal attempts in this age group are precipitated by overt quarrels; and spite, revenge, pique, and jealousy are infrequent motives. Homicidal trends were clearly identified in only four cases. One old man confessed to fears that he might harm the married daughter whom he was living with and who was showing him little affection; another warned his wife not to sleep with him, in case he might strangle her. A widowed woman brandished an axe over her only daughter, who was shortly to get married; and a spinster had obsessional thoughts and impulses towards attacking with a knife her younger and more attractive sister.

Guilt.—This factor, often difficult to assess, was infrequently expressed by these suicidal old people in depressive delusions or in self-reproach. It does not appear to be a major factor in the suicidal attempts of the senium.

Alcohol.—Three men were under the influence of alcohol at the time of their suicidal attempt, but not to the degree that they later had an amnesia for the act. Two men and two women habitually took alcohol in excess; two men and one woman had previously been alcoholic.

Other Factors.—Retirement from work contributed directly to the suicidal attempts of two men; but its more indirect and insidious effects are difficult to gauge. Recent moves of home and changed domestic circumstances precipitated the attempts of two women. The death of friends appeared to be the motive in only one case. Disillusionment is hard to judge: it is part of the senescent attitude to life; one would not expect it to be of lethal strength.

One is aware, in listing the various motives, that some of them are superficial and derived from the patients' rationalization, and that the explanations advanced are at best partial. Ultimately these morbid acts are discharged at an unconscious level and are the outcome of a tremendous emotional turmoil, of which we discern only some of the effects. We guess at the strength of the despair, and we assume, though we cannot clearly define, the lessened controls.

Discussion

The state of the old person who attempts suicide reminds us of the vivid words of that Anglo-Saxon elegy, *The Wanderer*:

"He knows who puts it to the test how cruel a comrade is sorrow for him who has few dear protectors; his is the path of exile, in no wise the twisted gold; a chill body, in no wise the riches of the earth; he thinks of retainers in hall and the receiving of treasure, of how in his youth his gold-friend was kind to him at the feast. The joy has all perished. . . . Then comes darkness, the night shadow casts gloom, sends from the north fierce hailstorms to the terror of men. Everything is full of hardship in the kingdom of earth; the decree of fate changes the world under the heavens. Here possessions are transient, here friends are transient, here man is transient, here woman is transient; all this firm-set earth becomes empty."

In this age group, as in others, while suicide may appear a sufficiently logical reaction to an intolerable situation, it is in very few instances carried out under the direction of reason unperverted by morbid emotions.

The infirm situation of the old person needs no elaboration here; his vulnerability to disease and death and his relative social inutility are obvious. With a sense of this latter old people may be rather deeply imbued. In certain primitive societies it was conventional, and apparently occasionally obligatory, for old people to commit suicide when on account of their infirmity they had become a burden on the rest of the community. A period of famine was then the usual precipitant of their self-sacrifice. While such crude biological and economic pressures have been more or less lifted from old people in our society, the mechanization, pace, and restless competitiveness of an industrial civilization may equally be inimical to them.

Prone as he is to painful feelings of being a burden to others, it is obviously very necessary for the old person,

particularly if he is no longer economically useful, to feel loved and wanted. There is much concern about the welfare of old people, but the very fact that their position is receiving such detailed scrutiny indicates that their social status is changing. In their ever-increasing numbers old people are becoming a social problem, and the fear is expressed that they may be becoming a social burden. Old people seem more often now to be falling outside family units. The attitude of our society as a whole seems to be ambivalent. There is a tendency, for example, towards segregating old people—a tendency which is not wholly explicable in terms of the housing shortage; and, while the importance to the old person of continued employment for as long as possible is stressed, arbitrary and traditional ages of retirement are maintained and even embodied in new legislation.

Though, judged by crude material standards (such as their financial state or their housing situation), the old people in this series of cases were in general not badly off, there was evidence that they were subject to environmental stresses, particularly to community attitudes expressed in the behaviour towards themselves of their own relatives, which, though more subtle, were not less wounding. Most of these old people were also temperamentally vulnerable. Many gave a family history or previous personal history of nervous or mental illness; many had suffered the disabilities of a broken home in childhood; and most of them had defects of personality which had made them prone to reactions of anxiety and insecurity, and to social isolation with its attendant feelings of loneliness. It seems that when a depressive illness develops in such a predisposed individual—particularly when resistance, already lowered by the effects of old age, is still further impaired by physical ill-health, and there is a lack of love due to the loss of a marital partner or rejection by offspring—a reaction of weariness, loneliness, and despair may be set in motion which tends to eventuate in suicide. This is a generalized statement; but it is doubtful if we have at present enough evidence to be more specific. Each case differs in certain respects; predisposing and precipitating factors vary in the relative intensities of their incidence, and much in every case remains unknown.

It is evident from the above that the known factors which tend to precipitate suicide in old people are the same factors which in general tend to precipitate their mental breakdown. The prophylaxis of suicide in this age group coincides, therefore, with the wider objectives of a programme of mental hygiene, about which fortunately there is now wide theoretical agreement. The promotion of optimum mental health in earlier years; the encouragement of continued occupation for as long as possible and the fostering of other interests; the maintenance of social integration; the avoidance of undue fatigue; the early and adequate treatment of physical illness and the alleviation of fears about it; the prompt diagnosis and treatment of mental illness, and particularly of depressive reactions; the recognition of the warning in the suicidal talk of the old person: all these items and objectives are of the greatest importance, and in their pursuance a great many agencies and individuals have their parts to play. The problem is far wider than merely a medical one. Suicide is a disease of the community, and the community as a whole has to exert many resources in its self-healing.

Summary

In a series of 200 consecutive cases of attempted suicide admitted to a general hospital 40 were aged 60 years or over. Detailed social and psychiatric data about these 40 cases are presented.

A family history of psychiatric abnormality was obtained in 65% and of suicide in 17% of the cases.

One-half of the group came from "broken homes." More than one-half had previously been mentally ill. Previous suicidal attempts had been made by 17%. Three-quarters had vulnerable personalities, which tended to isolate them socially.

Of the suicidal attempts 80% occurred in the setting of a depressive state. Evidence suggested that the recurrence of a depressive illness in old age had been less well tolerated than earlier attacks, and that the suicidal attempt of an old person is almost always a genuine one. Less than one-quarter of the attempts had been impulsive.

Significant physical disease was present in 60% of the cases.

Attention is drawn to the multiplicity of precipitating factors and motives, and stress is laid on the importance of feelings of loneliness and physical incapacity, fear, and identification with a dead person.

Adverse social factors of a material kind were found to be less important than community attitudes, which tend to make the old person feel useless and unwanted.

The importance of the problem of suicide in old people is emphasized, and a relevant mental hygiene programme is outlined.

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WORK AND AGE: STATISTICAL CONSIDERATIONS*

BY

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I propose to deal with four basic considerations regarding the elderly worker: (1) the relative numbers of old and young people in the population; (2) the proportions of old people still at work; (3) the relative mortality risks to old people in various broad types of employment; and (4) the amount of time lost on account of sickness.

Population

It is no longer news to any audience to announce that the proportion of young people in the population of this country is becoming smaller and that the proportion of elderly people is increasing. This situation, which is occurring in most Western countries as well as our own, is the result of a prolonged decline in the birth rate from about 1870 until about 10 years ago, accompanied by a reduction in mortality that began a few years earlier and which is still continuing. The outcome has been an age redistribution of the population, and Fig. 1 shows the changes that have occurred during the past 110 years and also what the situation is likely to be in 1991, as estimated on the basis of some simple and reasonable assumptions about trends of births and deaths during the next few decades. The proportion of the population of working ages, taking these as 15 to 64 years, has increased during the past century, and by 1951 there were 67 people of working age to every 33 people outside this age range—that is, two-thirds of the population in 1951 were aged 15–64. Unfortunately, the ratio of persons

*Read in opening a discussion in the Section of Occupational Health at the Annual Meeting of the British Medical Association, Cardiff, 1953.

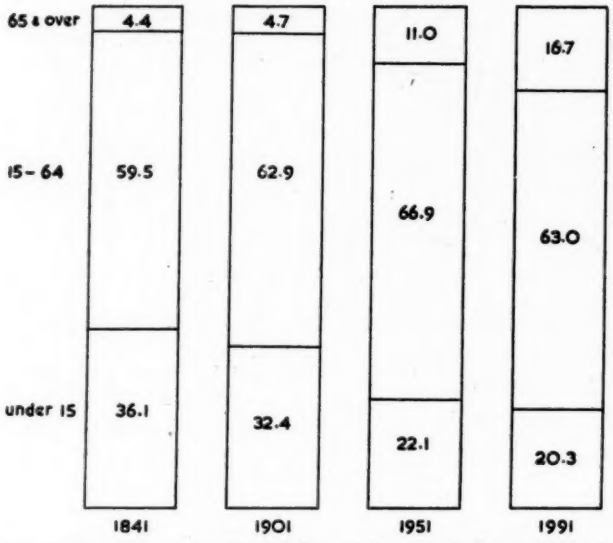

FIG. 1.—Percentage age distribution of the population (male and female) of England and Wales, past, present, and future.

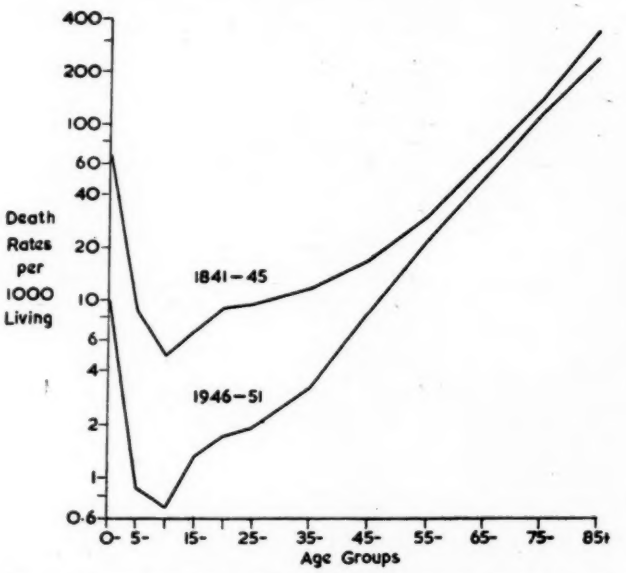

FIG. 2.—Death rates per 1,000 males in age groups, England and Wales, 1841–5 and 1946–51.

of working age to other ages is now just about its maximum, and by 1991 we shall be back to where we were in 1901. There will, however, be one very important change: a hundred years ago there were about eight children to every old person and at present there are about two children to each old person, but by 1991 there are going to be almost as many people aged 65 and over as under 15.

Now, although one of the main factors responsible for these changes has been improving mortality, the degree of improvement has been very different at different ages, as Fig. 2 indicates. During childhood and young adult life death rates have declined by 80% to 90% in the past 100 years, whereas at old ages the decline in mortality has been less than 20%. The effect of this differential improvement can perhaps best be illustrated by means of "expectations of life"—namely, the average number of years that people of a given age will live if subject to given mortality conditions. For a newborn boy in 1841 expectation of life was 40 years (Fig. 3) and by 1950 it had risen to 66 years—that is, an increase of 26 years. For girls the increase was even greater—namely, 29 years. For boys aged 15 years the expectation increased from 43 years in 1841 to 55 years in 1950. I mentioned, however, that improvement in mortality has been greater at younger than at older ages, and the effect of this is seen in the changing expectation of life of people aged 60. In 1841 this was 14 years both for men and for women, but by 1950 it had increased for men only to 15 years and for women to 18 years. This is rather an important point: although expectation of life at birth has increased 20 or 30 years this does not mean that people approaching retirement nowadays have 20 or 30 more years of life before them than their grandfathers, or perhaps great-grandfathers, had. In fact, they will on average live only a year or two longer.

None the less there has been some increase, and in showing that the changes at older ages in mortality, and therefore in expectation of life, are small compared with younger ages I do not want to give the impression that the age structure of the population over the age of 60 has been quite static, though indeed it was so for a long time. Fig. 4 gives the proportions of men at various ages over 60 years in four different years. In 1841 and 1901, men aged 60–64 outnumbered those over 75 by more than 2 to 1; in 1951 the ratio was 3 to 2; and by 1991, if recent mortality trends continue, there will be as many men alive aged 75 and over as aged 60–64.

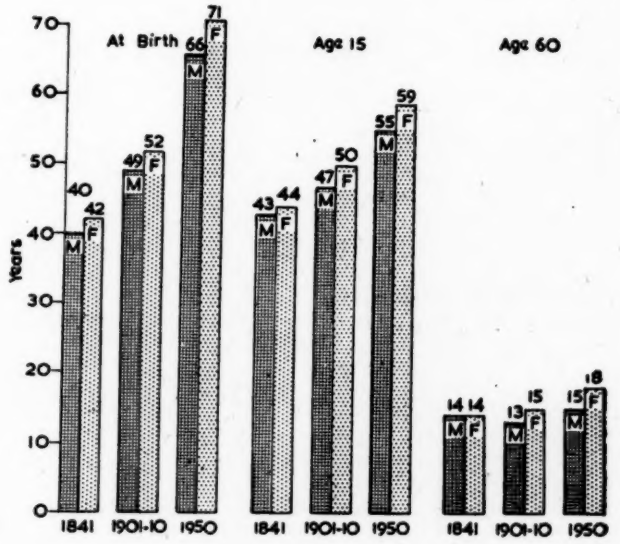

FIG. 3.—Expectation of life in England and Wales at various ages and at three periods of time.

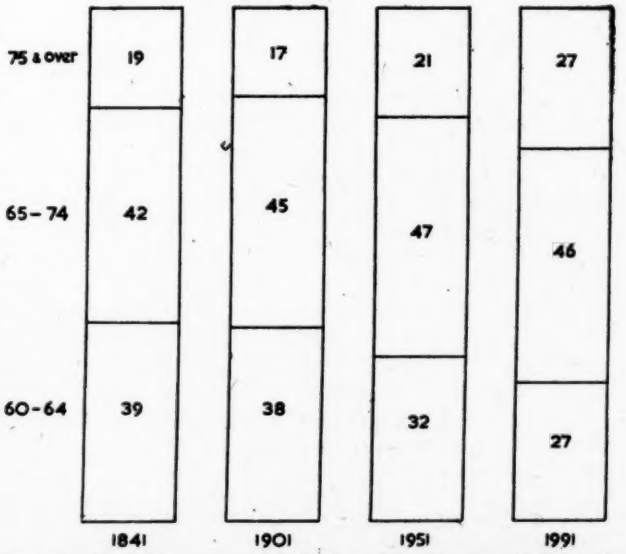

FIG. 4.—Percentage age distribution of male population of England and Wales, aged 60 and over.

Occupation

I turn now to my second topic, the occupational distribution of the elderly population as determined by the 1% sample analysis of the 1951 census returns. Fig. 5 shows the proportions of elderly men describing themselves as occupied or unoccupied. At ages 60–64 87% were still working full-time and 10% were retired. At ages 65–69 the proportions of these two categories were practically equal—48% still working whole-time and 47% retired. In the next age group, 70 and over, 20% were working whole-time, and 70% were retired.

Fig. 6 shows the status distribution of men still occupied at ages 60 and over. At ages 60–64 operatives constituted 78% of the total, and men working on their own account 9%. By ages 70 and over the percentage of operatives had fallen to 64, with a corresponding increase in the categories of employers, managers, and those working on their own account. People in these latter occupations carry on working after many of the men classed as operatives have stopped.

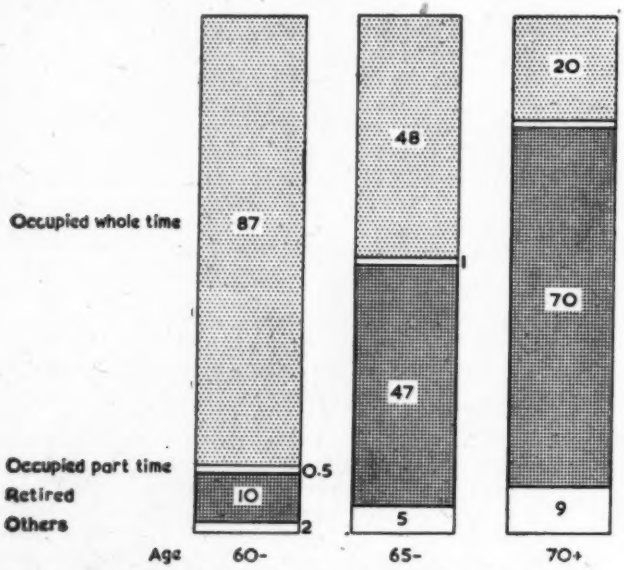

FIG. 5.—Percentage distribution of men aged 60 and over according to whether occupied or retired. Great Britain, 1951 census, 1% sample.

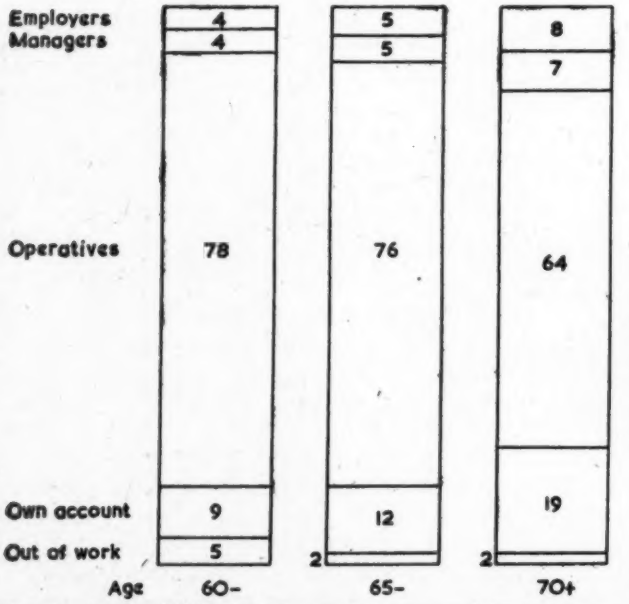

FIG. 6.—Status distribution of occupied men aged 60 and over. Great Britain, 1951 census, 1% sample.

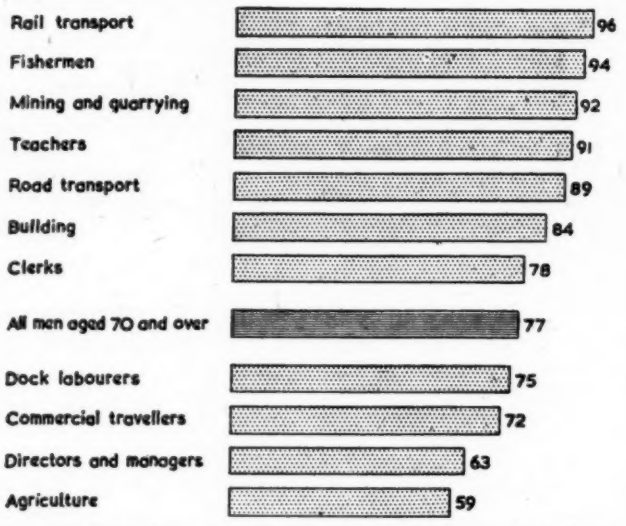

FIG. 7.—Percentage of men aged 70 and over, retired from selected occupations. Great Britain, 1951 census, 1% sample.

Fig. 7 lists a number of large occupational groups and shows the percentage of men aged 70 and over described as retired, expressed as a percentage of the total number of men at these ages in those occupations. The lowest proportion of retirements was for agricultural workers, 59% retired, followed by directors and managers, of whom 63% were retired. Occupations in which high proportions were retired were rail transport workers (96% retired), fishermen (94%), mining and quarrying (92%), and teachers (91%).

Occupational Mortality

Since 1851 it has been the custom of the Registrar-General to calculate occupational mortality rates for years in or around that in which there was a census, and in due course an occupational mortality analysis for years 1949–53 will be made upon the basis of the 1951 census. A preliminary analysis has just been completed for the year 1950, utilizing the census 1% sample occupational data, and Table I shows some of the results that have emerged. For men aged

TABLE I.—*Death Rates of men Aged 60–64 in Selected Occupations Per Cent. of Corresponding Rate for All Men. England and Wales*, 1950

Social Class	Occupation	Death Rate
II	Farmers	69%
III	Hewers and getters	187%
	Other mine-workers	139%
	Transport workers	108%
	Clerical workers	98%
	Armed forces	171%
IV	Agricultural workers	74%
	Mine-workers	101%
V	Building labourers	70%
	Dock labourers	128%

60–64 mortality was notably low for farmers, for other agricultural workers, and for building labourers, all with death rates less than three-quarters of the average for all men of that age group. Mine-workers in social class III—that is, skilled workers—had an unfavourable mortality experience, particularly hewers and getters, and another occupational group with a high death rate at ages 60–64 were men described as members of the armed Forces.

Incapacity Amongst Elderly Men

One of the important factors to be taken into consideration in determining whether an elderly man is still employable is the amount of time he is liable to lose from work on account of sickness. Some information on this question can be obtained from the results of the monthly Survey of

Sickness conducted in England and Wales from 1944 to 1951. For the purposes of this survey, incapacity was defined as inability on account of sickness to go out to work or, for persons not at work, inability to go out of doors. It is important to note this dual definition of incapacity, because it is a little difficult to interpret the figures for elderly men, many of whom do not go to work and to whom the second half of the incapacity definition applies. Since a retired man may be well enough to go out of doors but might not, had he been still working, been well enough to go to work, the incapacity rates revealed by the survey are not quite comparable from age to age. None the less they are worth looking at and thinking about.

In an average month of 1950 the percentage distributions of men aged 16–64 and men aged 65 and over according to their reported days of incapacity compared as shown in Table II.

TABLE II

Days of Incapacity	Ages 16–64	Ages 65+
0	91·3	89·1
1–3	2·7	1·7
4–10	2·8	3·4
11 and over	3·2	5·8

It is surprising how little difference there is between the two groups; almost 9% of men of working ages had some incapacity in the month, and for elderly men the proportion increased only to 11%. It was mainly in the group with incapacity of more than 10 days that the elderly men were in excess, their proportion (5.8%) being nearly double that for younger men. This predisposition of the elderly group towards more prolonged incapacity resulted in their having a quite definitely higher average incapacity rate than younger men—namely, 1.6 days per man per month, compared with 0.9 day for men aged 16–64. However, it must not be supposed that suddenly at age 65 the incapacity rate jumps from the lower to the higher level. The increase is gradual and continuous from about 35 years of age upwards, and indeed the figures suggest an actual falling off after 65.

TABLE III

Age:	16–	25–	35–	45–	55–	65–	75+
Days of incapacity per man per month	0·69	0·69	0·79	1·02	1·61	1·57	1·58

By reason of the special definition of incapacity already referred to, applying to people who do not go to work, the flattening off of the rising trend of incapacity rates after age 65 is probably fallacious, and no doubt the curve in fact keeps rising. I do not want to enter into a detailed discussion of these incapacity figures, and I shall merely emphasize the two points which they bring out—namely, that the proportion of elderly men who do *not* have any incapacity is almost as great as for younger men, and also that there is no evidence of a sudden increase in incapacity amongst the higher age groups, but a gradual increase throughout adult life.

These figures support in a general way the thesis which is being increasingly put forward nowadays, that there is no justification for an arbitrary and rigid retirement policy applied to everyone at, say, age 60 or 65 years, or indeed at any age, on the grounds that beyond that age service will be so punctuated by incapacity as to make it unprofitable for it to continue. Though this is no doubt true for certain occupations that impose a heavy physical or mental burden upon the elderly and impair their health, it is not the case for the majority of occupations, and, provided an elderly man can be relieved of some of the load he has previously carried, there seems every reason for him to keep on working until his own individual state of health renders it expedient that he should stop. The important thing, however, is that he be relieved of his load, and in some cases this may be achieved only by change of occupation. There is indeed much to be said for every man taking stock of his position when he is approaching the sixties and considering how long he will be physically and mentally able to carry on with his present job, and whether he wants to carry on any longer.

The man who carries on with his customary work after 60 may find himself unable to cope with it a few years later, and he may also find that he has lost the ability and inclination to turn to anything new; but the man who breaks away at 60 and takes on a lighter job, particularly if it is one in which he can find some personal interest, may find that he has embarked upon a second career in which he can continue to give useful and satisfying service for a further 10 years or more. Though we may all have some kind of humanitarian urge to relieve elderly people of the burden of having to keep on working for their living and to allow them the rest that they deserve, it has to be realized that to remove compulsorily from work an elderly man who is fit and eager to carry on doing something is not an act of kindness to that man. The suicide rate is high amongst elderly people. It might not be so high if more of them were given the opportunity of continuing to be useful, productive members of the community.

EXTENDING THE EMPLOYMENT OF OLDER PEOPLE*

BY

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It is perhaps presumptuous for a psychologist, especially an academic psychologist, to speak about the employment of older people, since industry and industrial medicine have had to deal with this problem in a practical way for many years, and have managed to solve it with very fair success in a number of cases. I hasten to say, therefore, that I speak with a very real sense of humility and that my remarks should be taken as suggestions for consideration rather than as confident assertions.

It is well known that the average age of the population has been increasing during recent years. From 1851 to 1921 the proportion of people over 65 was nearly stable at about 10% of those between 20 and 64, but in the 1951 census the proportion had risen to 18%, and it has been estimated that by 1961 it will be 22%, and by 1971, 28%. In other words, whereas up to the years immediately following the first world war there were about 10 people between 20 and 40 for every one over 65, there are now fewer than six, and 20 years hence there will be fewer than four. If present retirement ages continue there is likely to be a serious shortage of labour before long. Realization of this has led to questions being raised in many quarters whether employment and retirement policies for older people, built up in the early years of the century and in the slump conditions of the 'thirties, are adequate for conditions to-day. Even if they are, it is urged that some measures should be taken now to forestall future difficulties.

The problems of employing older people involve several disciplines. Some are medical. Some are economic, concerned with pensions schemes and pay

*Read in opening a discussion in the Section of Occupational Health at the Annual Meeting of the British Medical Association, Cardiff, 1953.

rates related to age. Some are social, such as the effect of the age of retirement upon the age of promotion for younger men. I shall not consider these problems, but will confine myself instead to those which are concerned with some aspect of ability. I do this not only because these are the problems with which I am in closest touch, but because it is likely that many economic and social problems are secondary to them. It is well known that many changes occur with age—eyes and ears become less sensitive, reactions become slower, and ability to learn diminishes. These are facts we cannot escape. It is often believed that we can transfer the implications of these generalizations direct to the problem of employability, but this we can do only in part. Such generalizations are unduly wide, in the sense that they are true only of some people and in some respects. At the same time they are too narrow in that they fail to recognize many other changes which occur. Even when they are true the circumstances may be such that they are unimportant.

One of the commonest policies with regard to the employment of older people is some form of conscious or unconscious selection of a few to stay on while the rest retire. This policy is justifiable in the sense that for almost any job we like to name we can find some older people who can do it well. As we go up the age scale the differences between one individual and another become greater, so that, although the average performance may fall, some individuals will do as well as, or better than, the majority of young men. What is required, however, is a more radical solution than this. We need to specify work which is suitable for the majority of older people, which will enable them to continue at their jobs beyond what is now regarded as the normal retiring age, and in doing so to maintain their efficiency and self-respect, if possible without special allowances.

I will try to summarize the main points about what we know. Some are perhaps obvious, some may be new. As we know little as yet, I make no apology for giving some attention also to the methods of research whereby we can learn more.

Methods of Research

Two points should be stressed at the outset. The first is that our problem is not solely with employment beyond the normal retirement age. Ageing is continuous; by the age of 30 the beginnings of many changes, which become striking in extreme old age, can already be seen. As a result, many of the most important problems of ageing in relation to employment occur in middle age. The second point is that, as in most human affairs, it is that which is unpleasant and distressing to which we are apt to pay greatest attention. Most of the scientific knowledge we possess about ageing is of ways in which capacity and performance get worse as people grow older. There are, however, clearly ways in which age brings improvement, such as steadiness of character, conscientiousness, and patience. Unfortunately these qualities are elusive of precise definition and have so far not proved amenable to scientific study.

Scientific measurement of human performance in relation to age has been of three main types: (*a*) Surveys, using tests either of performance or of mental abilities, such as so-called intelligence tests. (*b*) More detailed studies of performance, using laboratory experiments in which people are given carefully designed tasks to do under controlled conditions. (*c*) Studies of present practice, population trends, age distributions, and labour turnover in industry.

None of these approaches is sufficient on its own. Mental tests show us some of the main outlines of ability, and, although their results provide only a sketchy picture of human performance, they permit studies to be carried out on a large scale and so give data about norms of performance at different ages which are not readily obtainable in any other way. Such tests have shown that functions such as intelligence, speed of action, strength, and ability to learn by rote all decline with age, usually from a peak performance in the twenties. The decline is slow until the sixties, more rapid thereafter. The shortcomings of tests as commonly used are that the scores lump together many different aspects of capacity, and that we often have little idea of what they measure and whether one unit of score is equivalent to another. They are also not well adapted to the study of what we may call the process of a man's performance—the sequence of events whereby he attains a given end-result.

These disadvantages may be avoided in laboratory experiments which enable us to study performance in greater detail, and give a clearer lead to the understanding of why changes come about. With large groups of people laboratory experiments are too laborious, and this means some uncertainty whether samples of different ages are representative, but with care this drawback can be minimized. I will not enlarge upon the findings of such experiments, because they are the burden of most of what I have to say later. One other limitation upon them must, however, be mentioned. It is seldom possible to use this technique to study performances over a long period of time—usually about half an hour is the limit. We must therefore be cautious when drawing inferences from the results for work done day in and day out. This caution is necessary for two reasons: first, that performance can often be maintained for short periods at a level which is impossible over a longer working spell; and, secondly, it is probable that some of the difficulties experienced by older people in an experiment would disappear with long-continued practice.

Because of these shortcomings, problems of employment must at some stage be studied among people doing their daily work. The value of experiments lies in their helping to sort out genuine age trends in industry which are likely to lead to continuing problems from the multitudinous forces of social and economic pressures and accidents of history which tend to confuse the picture. The task of studying ageing in industry is difficult and demands much more care and clear thought than appears at first sight. It is all too easy on the one hand to leap to conclusions on inadequate evidence, or on the other to become bogged down in a despair of caution over the number of complicating factors which might conceivably be involved.

What we need to do is to take the results of laboratory experiments and to use them to tell us what to look for in industry, then, if the expected age trends are found and they are bad, we need to use our experiments again to suggest ways in which the trends might be minimized or removed.

When we look at industry in this way, it is necessary to look in detail, not at whole industries or factories or classes of work, such as skilled, semi-skilled, or unskilled, but at particular operations. Performance at any task will depend upon the match which can be made between the demands of the task and the capacities of the man doing it. The demands made and the capacities involved can vary greatly according to what at first sight appear to be trivial details of the task. Changes of performance with age will occur when changes of capacity become such that they can no longer be matched to the demands of the task. When this happens there appear to be three logically possible ways whereby a match may be restored: (1) the change in the man might be arrested or reversed; (2) the demands of the job could be modified; and (3) the man could be moved to another job making less severe demands.

Present policy usually concentrates on the third of these possibilities: certain relatively low-grade jobs, such as doorkeeping and sweeping, are reserved for old people. This

policy would seem inadequate, however, not only because it wastes the skill and experience of men who were formerly doing higher-grade jobs, but because the amount of low-grade work available is not sufficient for the numbers of old people who will have to be employed.

1. Arrest or Reversal of Age Changes

In so far as changes of ability are underlain by definite organic changes, this line of action involves medical questions with which I am not qualified to deal. There is, however, another type of age trend we can legitimately consider—namely, attitudes and opinions changing with age, which sometimes seem to place older people at a disadvantage. To take one example : older people often lack confidence in their ability to an extent which is not justifiable and is revealed only when circumstances force them to do what they believed to be impossible. This lack of confidence is doubtless fostered by popular sayings and opinions, such as, "You can't teach an old dog new tricks," which are apt to cause exaggerated ideas of disability and lead to unwillingness to try. It may be due also to other attitudes—for instance, the desire to deserve the respect due to age and not to fail in the eyes of younger people ; or the belief that hard work brings premature ageing ; or, sometimes, bitterness at failure to achieve an ambition or lack of some worth-while goal for which to work.

How to assess these attitudes we do not know clearly at present. We can find out what people say about them, but such statements are often inaccurate, not only because of deliberate falsification but because people often do not realize their true motives. The understanding of these forces is still the province of the shrewd and wise observer, although, when the bogies from which they derive their strength have been discovered, scientists and educators can help in dispelling them.

2. Changing the Demands of the Job

The field which undoubtedly offers the greatest opportunity to improve employment prospects for older people lies in changing the demands made by certain classes of job. Some jobs seem to be such that the skills involved are well maintained into old age, but there are a few important exceptions. Difficulties are not always easy to detect. They may not show in such statistics as production figures, because as a man gets older he seems often to compensate for any growing difficulties by increased care and effort until the strain becomes too great to be borne ; then, instead of carrying on at a reduced efficiency, he changes to another job. The reason given for his change may not be a true one. Sometimes, for instance, a change is made ostensibly on medical grounds, but if these are examined they are, as Richardson (1953) has shown, found to be insufficient to account for the magnitude of the change involved. It may sound a surprising suggestion, but I think it is scarcely an exaggeration to say that when a job is found where there is a substantial loss, for almost any reason whatever, of people in the forties and fifties, an age difficulty should be suspected.

We may consider difficulties arising in industrial work under three heads :

(a) Speed

Fall in speed of performance with age is common but by no means universal. It is very much greater in some tasks than in others ; and in some tasks at least there is clear evidence that where older people are slower is in perceiving and giving meaning to incoming signals for action rather than in the actual speed of making responding movements. The time required to deal accurately with an incoming signal and to take the necessary action varies with the signal and action involved, but is seldom, for a man in the twenties, less than about half a second (for a review of the literature see Welford, 1952). This is the maximum speed at which we should expect a young man to pick up items individually from a pile and place them in a machine—with one signal from the pile and one from the machine making one article handled per second. For people in their late fifties and sixties the time seems to have risen on an average to about two-thirds of a second. The implications of this are clear and obvious—we need to reduce the rate at which distinct signals have to be dealt with to the point at which the effective limit of speed at a job is transferred from the reaction time of the man to the operation time of the machine. This can be done in several ways : (*a*) By grouping signals so that, given the first of a sequence, the ones following can be "assumed" and require only a minimum of attention. (*b*) By sequencing actions automatically by machine. To carry this to its logical limit would convert the machine operator into a machine minder, but comparatively minor alterations coming far short of this could often make the required difference. (*c*) By reducing the accuracy required—for example, by making it possible for finished articles to be tipped into a chute instead of having to be placed accurately on a pile. (*d*) By giving older people larger products to deal with, which take longer to process. This is already done with good effect in some factories.

The amount of perceptual "effort" can be reduced by logical natural relations in laying out a task, as in the commonly used arrangement for an assembly job when one part is taken from each of a number of boxes in turn along a row. This arrangement may not, however, be enough to reduce the difficulty of the task for older people. Probably some indication should also be given which makes it unnecessary for the operative to remember from second to second where he has got to along the row.

It is important to realize that the perception of signals and the shaping of action in response to them can often take place while a previous action is being carried out, so that, if signals for actions are available a little ahead of the time at which the action is required, slowness in dealing with them will not be as apparent as if they appear suddenly and action has to be taken at once.

More subtly, it appears that every time an action starts or stops attention is apt to be deflected, probably by the kinaesthetic stimuli which result from the rapid acceleration or deceleration. This means that if actions can be rounded and continuous they are likely to be substantially faster, especially for older people, than if they are jerky and intermittent. This is an additional point in favour of giving signals for action ahead of time, because when this is done actions can be made to flow into each other smoothly.

Very often speed and accuracy of performance appear to be compensatory. Excessive speed will lower accuracy, and vice versa. In tasks where this relation occurs it is commonly found that older people choose accuracy rather than speed and that the accuracy they achieve often offsets their loss of speed, because they waste less time making errors. The logical conclusion to be drawn from this, which is followed with success in many cases, is deliberately to place older people upon tasks for which care and accuracy are more important than speed.

The most serious effect of speed for older people appears when this compensatory relation cannot be exploited. This is particularly the case with operations which we may call *paced*, where actions have to be taken at a speed which is not determined by the operator, and any slowness will lead to an error or omission which cannot be redeemed subsequently. The best examples of this occur on certain rapid conveyor lines. The numbers employed on these appear to fall away sharply between 45 and 55, so that after 55 hardly any are left. There seems to be little difficulty in recruiting people for these jobs even as late as 40 or 45, and often they seem able to carry on after 55 at the same work if they can do it at their own speed. A possible way of mitigating this difficulty is to introduce buffer-stocks along the conveyor line, which would afford a slight latitude

in the timing of individual items and enable the operator, if he is slow at one moment, to make up time in the next. It should be pointed out that not all conveyor lines have this characteristic of rigid pacing of performance. Some work at a speed which is comfortably below the maximum the operator can stand, and others are such that it does not matter if an item is occasionally allowed to go by (Belbin, 1953).

Mere pressure for speed such as that imposed by piece rates appears to cause less difficulty to older people than does rigid pacing. The reason presumably is that they are able to adjust the speed to suit themselves and to give full play to the advantages they gain from care and accuracy.

A very interesting study by Weston (1949a) of performance at a visual task has shown that poor lighting, small size of detail to be seen, and lack of contrast between objects viewed and their background can lower speed of work between the twenties and the fifties, even when subjects are matched for visual acuity by Snellen charts and Jaeger test types. It seems clear, as Weston (1949a, 1949b) points out, that improvement in one or other of these respects could often raise the speed of work by older people, and that any given degree of improvement would benefit them relatively more than it would younger people. It is also possible, although I know of no evidence on this point, that analogous improvements could be secured in tasks involving listening, as, for instance, when inspection work has to be carried out in terms of the sound made by the moving parts of a machine. Amplifying the sound or keeping down background noise might raise the speed with which faults could be detected under these conditions, especially by older people.

(b) Complexity

Loss of speed or accuracy, or both, appears to be much greater with some more complex tasks than with simple ones. This is not to say that the more complex tasks cannot be done at all, although the maximum possible complexity is probably diminished. Nor is it to say that the longer time taken by older people over a highly complex task may not be accompanied by the application of knowledge which has required a long experience to gather, and which results in decisions and actions having a degree of skill not attainable by a younger man. At the executive level, the implication is that a load of routine work on which occasional important decisions are superimposed is likely to tell on an older man more than on a younger, unless the routine is so simple as to require hardly any attention. Delegation and comparative leisure would seem to be especially important in later middle age if the highest quality of decision is to be maintained.

At the operative level there is evidence to suggest that four types of complication are likely to cause difficulty for older people. First, where actions have to be performed without adequate sensory data to guide them, as, for instance, where a man cannot see what he is doing (Szafran, 1951). Second, where a large quantity of data is presented for digestion all at once, especially if it is in an ill-assorted order—logical sequencing in the presentation of information would seem likely to be helpful to older people. Third, where a quantity of evidence has to be pieced together without using aids to memory such as notes. The fourth, and perhaps the most interesting, type of complication is concerned with what essentially amounts to a kind of abstraction. When we handle an object directly, as, for instance, when we move an object from one position to another by hand, the relation between the perception and the action involved is direct and simple. So it is with hand tools, such as chisels and hammers. It is, however, not so with machine tools, where the direction, force, and form of actions may bear only indirect or symbolic relations to the effects they produce. A very simple example of this is that the turning of a vertical wheel may bring about a horizontal movement of a tool carriage. Research on what are called display-control relationships of this kind has shown that some are better than others even for younger men. The difference appears to be much greater for older men.

It is possible to get used to any display-control relationship, although unnatural ones may cause temporary difficulty in time of stress and lead to accidents. Persistent difficulty is likely, however, when the relationships keep on changing, as when a man works in turn on several different machines which have different systems of control. I think it is fair to say there is a great need for standardization in machine design, taking already well-verified research into account.

(c) Physical Demands

We are often told that heavy work is unsuitable for older people, and yet at the same time it is clear that a very large number of older people are engaged upon work which is classed as at least moderately heavy (Industrial Welfare Society, 1951). Several reasons have been suggested why they are able to do this work. It may be that physical development acquired when young enables them to continue when old. It may be that the knacks they develop in the course of experience make the work in fact lighter for them than it would be for a younger man. It may be simply that moderately heavy work does not make demands for muscular effort which are beyond the capacity of most normal older people. Discussion of heavy work in relation to age is hampered by a lack of knowledge of what "heaviness" means. We do not know whether it should be assessed in terms of physical effort and, if so, whether the maximum physical effort at any time or the average over a period, or whether it should be in terms of activity which might involve a perceptual factor in the sense that as a man turns to and fro he has to keep on looking first at one thing and then at another. Alternatively, some heavy work seems to be so classed mainly because it is dangerous, demanding either physical fitness and maintenance of balance, as when working at heights, or vigilance, as when handling dangerous materials. It is possible that heavy work as usually conceived means work which "takes it out of you" in any of several different ways, and that it is not really correct to think of all types of heavy work as belonging to a single class.

All forms of heavy work may be contraindicated for some people, and some forms of heavy work for all older people on medical grounds. Where these are absent it appears that while older people show a strong tendency to move away from really strenuous work (Richardson, 1953), they continue on jobs in which considerable physical effort is interspersed with periods of lower demand. It is probably true to say that moderate demands for physical effort cause less trouble to older people who are fit than does pressure for speed.

3. Training

However successful a policy of adapting jobs to the needs of older workers may be, there will be some men and women, as now, who must, or will wish to, leave their jobs and learn new ones in middle life. Such changes are not to be undertaken lightly, because, unfortunately, studies of learning indicate with striking uniformity a fall in learning ability from the twenties or thirties onwards. Beyond this age, learning to a fully adequate level can be achieved by some people and at some jobs, but it usually takes longer, and may therefore be prohibitively expensive. Good performances by a few middle-aged people who do train for new skilled jobs is not a reliable guide to the capacity of the majority, because almost certainly there are many who feel it is hopeless to take up a new skill in middle life, and only those unusually confident apply.

"Learning" is used as a blanket term to cover several distinct processes. The material to be learnt has to be perceived and comprehended. It has to be memorized, retained over a period of time, and then produced for use on a subsequent occasion. Now, there is evidence that

older people can usually remember well what they already know. The difficulty in extreme old age is mainly in the memory of the immediate past. Some people complain of loss of short-term memory much earlier, and we may well wonder whether it begins in a mild way in the thirties, or even the late twenties. These are the ages at which difficulties in training are usually first reported. Once a skill has been learnt it usually survives well into old age. It would seem, therefore, that the problem is really in the actual act of learning, so that the difficulty for older people occurs during the training session itself, and that difficulties in later performance are not due so much to failure of retention as of not taking enough away from the training session.

Difficulties in training seem to be of two main kinds. First, the perception and understanding involved take longer, and training is usually a "paced" task. Measures to avoid this difficulty should aim either at slowing down the pace of instruction, especially in the early stages, or at giving the trainee control over the speed. Thus, for example, we should expect an older person to do better on his own than in a group. Again, there is a little evidence which suggests that, if the trainee's educational level is suitable, written instructions may be better than demonstration. With written instructions the trainee can go back if he misses a point and can ponder anything which is not clear. Another possible means of reducing the time stress of instruction is to prepare for a change of job well ahead and give a trainee some opportunity of getting acquainted with his new job at intervals while he is still working at his old one. It may also be worth while to give rests and pauses during the training sessions. William James said that we learn to skate in the summer and to swim in the winter. His principle seems also to apply on a very much shorter time scale. Learning is often more thorough when brief periods of practice are interspersed with brief periods of other unrelated activity. Just how far this is important for older people is not at present known, but it seems likely that a leisurely and apparently time-wasting instruction would often lead to quicker and more complete mastery than one carried out on more intensive lines.

The second learning difficulty is that the comprehension of a complex task may be very hard to attain. Means of avoiding this difficulty are not well known, but breaking a complex task down into readily comprehended units, and attention to clarity of instruction in terms which are in line with what the trainee already knows, seem obviously worth careful trial and study. There is some evidence that older people are less tolerant of theoretical than of practical instruction, and that they do better if they are allowed right from the start to manipulate the material or try for themselves the machine they are learning to use. The reason seems to be that manipulation helps short-term memory in the same way that writing notes on paper helps with arithmetic. Theoretical instruction is like demanding that the arithmetic shall be done mentally.

When a trainee has failed to learn but is nevertheless forced to do something about a task with which he is confronted, he will inevitably tend to fall back upon his previous experience. This is not only true when training is nominally complete, but occurs also during the actual training itself. During the first training period he will build up some kind of method of doing the task which he will carry over to subsequent periods. If he is fortunate his method may be correct, and although speed may be poor he will improve with practice. If, however, he leaves the first training period with gaps in his comprehension of the correct method, these will be filled from his past experience, which may not be appropriate and may thus lead to errors which will have to be corrected. There is good evidence (Kay, 1951) that corrections of errors of this kind which involve modifying a method already built up are very difficult, so that if a trainee starts wrong he will have disproportionately greater trouble later. The principle is well known in learning games, typewriting, etc. It would seem to imply that the very first stages of training are all-important and that time spent over these is likely to be well repaid by savings later on.

Past experience can, of course, assist in the mastery of a new task when the task can be carried out by methods already familiar. Confusion seems to arise mainly when the methods required for the new and the former tasks bear some resemblance but are not entirely the same. This leads to the paradoxical situation that it may be easier to learn a new task which can be carried out by methods already familiar than to learn new methods for doing a task which has been done before. Also it may sometimes be easier to make a clean break from an old job than to transfer to a job which is superficially similar.

Other suggestions about training deserve consideration. For instance, older people may not like to take instruction from those younger than themselves or to perform in a manner they think inexpert in the presence of other younger trainees. The means of avoiding such difficulties are obvious. Again, it has been suggested that one of the reasons why older people find it difficult to learn is because they have got out of the way of learning, and that if a person makes a point of learning all through his life he will still be able to learn when he is old. Another possibility is that if a man has once learnt a skill while he is young he can take it up again when he is old, even though it has not been used during the intervening years; so that learning a variety of jobs while young provides a range of alternatives ready to hand if a change of work has to be made in later life.

To conclude, it would seem that, apart from social, economic, and strictly medical questions, we have two important leads towards improvement in the prospect of successful employment of older people. The first is a close scrutiny of methods of work and the design of machinery, especially machine tools. This means that the tackling of the problems of ageing has to be carried back from the shop floor to the drawing-office, and becomes in a large measure the responsibility of engineers. Parallel to this, we need a close scrutiny of training methods and perhaps the establishment and very careful administration of special methods for older people. Both would, I believe, have an important bearing upon the problems of the industrial medical officer, and I venture to suggest that both need the co-operation of the experimental psychologist.

These developments would benefit not only older people but middle-aged and younger people as well, although the proportionate benefit would increase with age. They would not, of course, overcome the problem of age in industry completely, but they could go a long way towards reducing it. The benefits would not all be immediate. There might be some immediate rise in production, but the main advantages would appear only gradually in the stability and flexibility of industry. Stability would increase owing to men being able to stay on a job to a later age, with the consequent avoidance of labour turnover and the difficulties it causes both to industry and to the men involved. Flexibility would be extended in the sense that when necessity dictated a change of work in middle life it could be made with less of the suffering it often entails at the present time.

I would like to express my sincere thanks to past and present members of the Nuffield Research Unit into Problems of Ageing. Most of what has been said here has been based on their work, much of it as yet unpublished.

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COSTO-CLAVICULAR COMPRESSION OF THE SUBCLAVIAN VEIN

BY

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In recent years the conception of costo-clavicular compression of the brachial plexus has been recognized as often giving rise to symptoms formerly always attributed to the pressure of a cervical rib or to compression of parts of the plexus by the scalenus anterior muscle. Moreover, Eden (1939), Walshe, Jackson, and Wyburn-Mason (1944), and others pointed out that costo-clavicular compression may also involve the subclavian artery. Falconer and Weddell (1943) and Le Vay (1945), furthermore, described cases of costo-clavicular compression involving not only the nerves and artery but also to a slight extent the subclavian vein. I have not been able to find records of cases in which costo-clavicular compression or pressure by the first rib has produced its chief effect on the subclavian vein rather than on other structures. In the following two cases traumatic wrenching of the shoulder appears to have led to such a condition.

Case 1

A machine attendant aged 29 caught his right hand in a conveyor belt, which caused a violent abduction and pulling down of the limb. Something seemed to tear in the right side of the neck and axilla. He felt a severe aching in the axilla, neck, and shoulders, just above the cubital fossa and in front of the right wrist and back of the hand, and the limb felt heavy. Within an hour the arm and hand began to swell. The whole hand felt numb, tingled, and became cold. He was unable to bend fingers or wrist properly. Some four hours after the injury he was referred to hospital with intense oedema of the limb, which failed to subside. Two weeks later he suddenly developed a temperature of 100.8° F. (38.2° C.), rigors, pain in the chest, severe sweating, rapid respiration, and tenderness in the right axilla. He was admitted to hospital and treated with sulphathiazole and penicillin. He recovered from these symptoms in two weeks.

The condition of the arm remained unchanged for the next four months, at the end of which time he was referred to me. Examination then showed gross pitting oedema over the whole right upper limb. The veins were not visible in the arm owing to the oedema. Some slight distension was observable in the right mammary veins. There was marked dropping of the tip of the right shoulder (about 3 in.—7.6 cm.). The right radial pulse was less easily felt than the left. B.P.: right, 142/90 mm.; left, 132/80 mm. With shoulders drawn back to the right B.P. was 110/40 mm., and the left 130/80 mm. Owing to the gross oedema it was impossible to tell if any muscle-wasting was present. All joint movements were limited by the oedema. Pin-prick was not appreciated over the inner side of the arm, forearm, and hand. It was found that if for a while the right arm was kept raised above the head the oedema diminished considerably. Radiographs confirmed the dropping of the right clavicle and scapula as compared with the left, but otherwise showed no abnormality (Fig. 1). A diagnosis of costo-clavicular compression of the subclavian vein was therefore made.

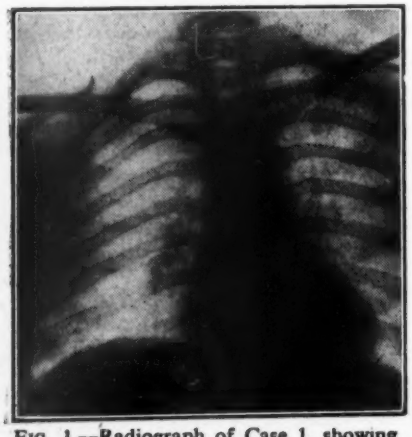

FIG. 1.—Radiograph of Case 1, showing the dropping of the right shoulder girdle. Note the different angles of the clavicles.

The patient was admitted to hospital and operation was carried out by Mr. A. D. Le Vay a year after the injury. The first rib was exposed through a supraclavicular incision and a large plexus of veins was found over the brachial plexus. The subclavian vein was compressed by the first rib, but contained no thrombus. The subclavian artery was normal. The omohyoid and scalenus anterior muscles were divided and 1½ in. (3.8 cm.) of the first rib underlying the brachial plexus and subclavian vein was removed. Some traction on the brachial plexus was necessary, and after the operation the patient developed slight ptosis, dropped wrist, and tingling and weakness of the four outer digits of the limb.

All oedema disappeared by the day after operation. He made an uninterrupted recovery, and returned to work five weeks after the operation.

Case 2

A cook aged 27 caught his right wrist in a food lift, which caused the whole arm to be wrenched downwards at the shoulder. This produced a sudden sensation of an electric shock passing up the arm. He was trapped for some time before he could be released. The arm began to ache, especially at night, the palm to tingle, and the limb swelled considerably throughout its extent during the next few days. The swelling was more noticeable when the weather was warm and was less marked on waking. The pain persisted for six months and was then replaced by numbness. The patient was referred to me 10 months after the injury.

On examination the hand and forearm showed severe pitting oedema. There was a marked dropping of the tip of the right shoulder. Partial fibrous ankylosis was present in the right finger and wrist-joints. No engorged veins could be made out in the oedematous limb, but the right mammary veins were dilated. The radial pulses were equal on the two sides. He seemed unable or disinclined to use the limb in any way, and it hung limply by his side. He could not be persuaded to exert any voluntary movement with it. All the tendon reflexes in the limb were unobtainable and all forms of sensation were apparently absent in a glove distribution reaching half-way up the upper arm. Radiographs confirmed the marked depression of the right as compared with the left clavicle, but showed no other abnormality. The arm was placed in a sling, so adjusted that it elevated the tip of the elbow and thus the tip of the shoulder. This resulted in a rapid disappearance of the oedema.

Two months later the patient was operated on by Mr. A. D. Le Vay through a supraclavicular incision, and partial removal of 1½ in. (3.8 cm.) of the first right rib was undertaken. Immediately after operation all the swelling rapidly disappeared, but complete paralysis and apparently complete loss of sensation of a hysterical type reaching as far as the axilla, in a glove distribution, remained. All the muscles responded normally to electrical stimulation. With massage, electrical stimulation of the muscles, and encouragement, symptoms gradually disappeared and he made a complete recovery within the next two months.

COMMENT.—It appears, therefore, that when the tip of the shoulder drops because of damage to or tearing of structures normally supporting it the subclavian vein may be compressed as it passes over the first rib, giving rise to venous oedema of the arm.

Significance of the Above Observations in Relation to Oedema of the Arm Following Radical Mastectomy

After radical mastectomy swelling of the arm may occur whatever type of incision is used (see Veal, 1938). (In cases of malignant disease of the breast it occasionally occurs before operation.) The swelling may be brawny, with thickening of the skin, or soft, with a thinned shiny skin. It is rare in the immediate post-operative period. It usually develops three to six months post-operatively, or it may not occur for a year or more. It may be accompanied by signs of recurrence of growth, such as a mass in the axilla, enlargement of the cervical lymph nodes, or nodules of growth in the scar. In other cases recurrent lymphangitis or cellulitis in the limb may precede the onset of oedema. In still others swelling occurs on return to normal activity with the arm. There may be no premonitory signs or symptoms. When swelling develops it may be persistent and progressive until the arm is enormous, or it may progress to a certain stage and then remain stationary, being unaffected by activity, dependency, rest, or elevation. Alternatively, the swelling may be intermittent, occurring during the period of activity and dependency of the arm and subsiding during rest and elevation. Usually the whole extremity is enlarged, but in some subjects the posterior portion of the upper arm is involved disproportionately. Disability of the limb is common and may reach complete incapacitation. Pain is frequent, and is either due to swelling or follows direct involvement of the brachial plexus.

Halsted (1921) demonstrated to his satisfaction the importance of lymphatic obstruction in production of the oedema, and this is the usually accepted explanation. He concluded that infection of the operation field leads to lymphatic obstruction, which results in swelling of the arm, and he applied to the condition the term elephantiasis chirurgica. All types of swelling are certainly not explicable on a single pathological basis, however, as it seems that the swelling may be caused by either lymphatic or venous obstruction; but it is difficult, especially in chronic cases, to differentiate clinically between the two types. The role of venous obstruction in this condition has received little attention. Veal (1937) studied 46 cases of swelling and 22 without swelling of the arm post-operatively and measured the venous pressure in the arm. He described venographic findings in 20 cases of post-operative swelling of the arm and classified the causes of the oedema into (1) lymphatic obstruction; (2) venous obstruction; (3) lymphatic and venous obstruction.

Lymphatic oedema is of a brawny type, persistent and only partially reduced by rest and elevation. The skin is firm and pits slightly, but does not wrinkle in the pit. This is the least common type after operation and constitutes about 10% of cases. Both superficial and deep lymphatics must be blocked. It may arise from recurrent or persistent infection of the soft tissues of the upper arm, axilla, and shoulder as a result of operative injury, in healed scars or recurrent carcinoma with ulceration of the skin surface. Patients often give a history of recurrent lymphangitis or cellulitis of arm and shoulder accompanied by chills, fever, and pain in the arm, neck, and shoulder. The cervical lymph nodes are often enlarged and tender. Swelling of the arm is usual with the first attack, but may subside with the infection. After recurrent attacks it persists. Occasionally direct extension of carcinoma is responsible for the lymphatic obstruction. Venograms show no block. There is no evidence of engorged collateral venous circulation or elevation of venous pressure in the arm.

Venous obstruction leads to a soft pitting type of oedema. The skin is thinned and tense, and wrinkles in the pit. Veal states that 70% of cases of post-operative oedema fall into this class. Swelling may temporarily disappear with rest and elevation. This type is commonly due to spread of malignancy to axillary and subclavian vessels. It may involve the wall of the vessels, leading to thrombosis. The veins may be occluded by benign operative scar tissues within either a few weeks or months. *X*-irradiation may also cause scarring, with the same result. The vein is obstructed high in the axilla, as shown by phlebograms, and the external jugular vein may also be distended if the venous obstruction is above the entrance of this vein into the subclavian. The venous pressure in Veal's cases ranged from 19.5 to 140 cm. of water, with an average of 53 cm. (the normal at heart level is up to 12 cm. of water). Oedema of the arm may not occur until the pressure is above 25 cm.

According to Veal, ligation of the axillary vein does not cause oedema of the arm, provided sufficient tributaries are intact. Sudden occlusion of the axillary veins by thrombi, as in primary thrombosis and effort thrombosis, may lead to massive oedema of the limb, disappearing in a few days to weeks owing to the development of a collateral venous circulation, especially in the chest (Veal and McFetridge, 1935). These collaterals are, however, removed during mastectomy. Nevertheless, it has been shown above that obstruction of the subclavian vein into which the mammary veins drain, even if the latter are intact, will cause pitting oedema of the arm.

If the venous oedema is not soon relieved there is increasing evidence of lymphatic obstruction, and so cases merge into the lymphatico-venous type. This is the late result of venous obstruction, which leads to dilatation of lymphatics and incompetence of their valves. This is characterized by thickening of the skin with pitting oedema, and is only slightly affected by rest and elevation. Dependency of the arm helps to prevent emptying of the lymphatics. Infection may follow. Venographic and venous-pressure findings are as in the venous group.

I have investigated 32 cases of post-operative oedema of the arm after radical mastectomy usually followed by *x*-irradiation. They were seen at various stages from 6 months to 15 years after the operation. Of these, four showed a marked dropping of the tip of the shoulder on the affected side. In all four the arm swelling appeared early and was noted when the patient began to get about after the operation and before receiving *x*-irradiation, which thus could not have played any part in its causation. No distended veins were visible in the oedematous limb. The venous pressure in the two arms was measured in these four cases, and were found to be as follows:

	Affected Limb	Normal Limb
First case	105 cm. water	7.3 cm. water
Second ,,	73 ,, ,,	10.4 ,, ,,
Third ,,	47 ,, ,,	10.3 ,, ,,
Fourth ,,	88 ,, ,,	9.6 ,, ,,

Oedema could be relieved by elevation of the tip of the shoulder by a sling passing under and raising the tip of the elbow. This indicates that the oedema in these cases was not due to dependency, but to venous obstruction associated with the dropping of the shoulder girdle. An example of such a case is the following:

Case 3

Ten years before attending for examination a woman aged 58 had a left radical mastectomy for carcinoma of the breast. Within a few days of the operation she noticed swelling and heaviness of the left arm. *X*-irradiation over the clavicle and in the axilla was begun later, hence the swelling of the arm could not be the result of irradiation. She had little pain in the arm and no sensory disturbance. She had not noticed that posture had affected the swelling.

On examination the whole upper limb as far as the clavicle was enormously enlarged with both pitting and solid oedema (see Fig. 2). The left clavicle was obviously considerably lower than the right and pointed downwards and outwards. The left arm veins were partially buried and were grossly dilated in the region of the elbow. There was great tenderness on pressure over the neurovascular bundle below the clavicle. The blood pressure in both arms was 175/100 mm. The left pulse, but not the right, was slightly diminished on depressing the shoulder. *X*-ray scarring and telangiectases could be observed above the left clavicle. Venous pressure in the right antecubital vein was 7.3 cm.

of water, in the left 105 cm. Radiographs of the chest confirmed the lower position of the left clavicle (Fig. 3). A phlebogram carried out by injection into the antecubital veins showed a hold-up of the radio-opaque material at the outer edge of the first rib on the left, but not on the right. The arm was rested in a sling so adjusted as to elevate the tip of the elbow and thus the whole shoulder girdle. This resulted in a pronounced diminution in the oedema. The patient refused operative removal of a portion of the first rib.

FIG. 2.—Photograph of Case 3 after radical amputation of the left breast with venous oedema of the left arm. Observe the dropping of the tip of the shoulder and clavicle on the left side.

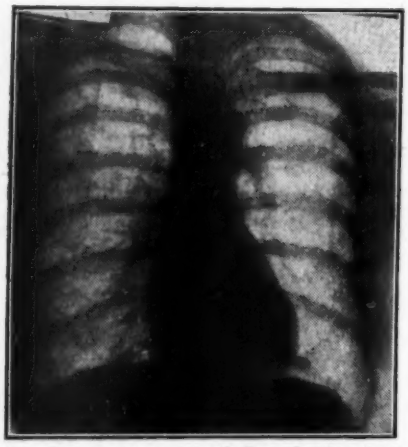

FIG. 3.—Radiograph of Case 3, showing the different position of the shoulder girdle on the two sides.

Comment. — It seems that in some cases of post-operative oedema of the arm after radical mastectomy the condition is due to dropping of the shoulder girdle following the operation, leading to obstruction of the subclavian vein by pressure on the first rib. The obvious treatment of such cases would appear to be removal of that portion of the first rib causing the obstruction. Such observations suggest that, normally, in some subjects the shoulder girdle, contrary to common belief, may in part be held in position not only by suspension from structures above, but also by support below on the structures of the axilla, which are removed during radical mastectomy.

Summary

Two cases are described in which there occurred obstruction of the subclavian vein by the first rib as a result of tearing of structures supporting the clavicle. The injury resulted in gross pitting oedema of the arm, which was relieved by removal of a portion of the first rib. The significance of the observation in relation to some cases of post-operative oedema of the arm after radical mastectomy is discussed.

I wish to express my gratitude to Mr. A. D. Le Vay, who operated on Cases 1 and 2, and to the consultant staff of the Royal Cancer Hospital, for kind permission to publish this paper.

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PYLORIC STENOSIS AND FIBROUS STRICTURE OF THE STOMACH DUE TO FERROUS SULPHATE POISONING

BY

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During recent years several accounts of the effects of poisoning from compound ferrous sulphate tablets have been published, notably by Forbes (1947), Thomson (1947, 1950), and Spencer (1951). There has been an increasing awareness of the danger if these tablets are accidentally swallowed by children. The following case is thought worthy of record, as it exhibits certain features not noted in the cases so far reported.

Case Report

A previously healthy boy, aged 17 months, swallowed between six and twelve tablets of a proprietary preparation of compound ferrous sulphate at about 2 p.m. on July 21, 1951. He vomited shortly afterwards, and this was followed by haematemesis. On admission to hospital an hour later he was found to be restless and collapsed. Gastric lavage was performed and anti-shock treatment instituted. He continued to vomit small quantities of bright-red blood all that day. Next day he was quieter and vomited some dark-brown fluid only once, at 11 a.m. No further haematemesis occurred. He was discharged on August 3, by which time he was vomiting only occasionally and his stools were normal in colour. His weight at this time was 19 lb. 4 oz. (8,730 g.).

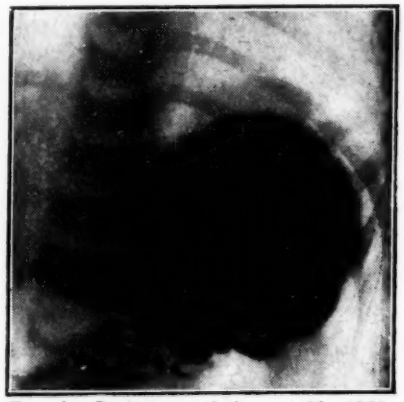

FIG. 1.—Barium meal August 28, 1951. Stricture of body of stomach.

After discharge from hospital he failed to improve. The vomiting gradually increased in severity, and he was readmitted to the same hospital on August 14. On examination he was found to be dehydrated and very restless. He weighed 17 lb. 12 oz. (8,050 g.). On August 17 and 20 he vomited large quantities of curds. On August 25 his weight was 16 lb. 12 oz. (7,600 g.). A barium meal examination done on August 28 was reported to show a stricture of the body of the stomach, through which the barium passed slowly, and some oesophageal dilatation (Fig. 1).

On August 31 he was transferred to Hammersmith Hospital. He was found to be a grossly wasted and dehydrated child, with depressed fontanelle; otherwise physical examination was negative. Intravenous saline and dextrose were given, and feeds by mouth of 1 oz. (28 ml.) of milk with casydrol. He vomited five times on September 1, and seemed to have abdominal pain on taking feeds. Next day he was better and less dehydrated. It was thought that there was probably an obstruction at the lower end of the oesophagus. A gastrostomy was therefore performed on September 4, and from then on he was fed by this route. During the next week vomiting still occurred, but consisted mostly of mucus. A chest radiograph on September 11 showed the lungs to be clear. Next day stomach aspiration yielded 13 oz. (368 ml.) undigested milk and mucus.

On September 13 *x*-ray examination showed the tip of the gastrostomy tube in the oesophagus and some air in the large bowel. A barium meal was given by mouth. The oesophagus showed some dilatation, but no obstruction was noted at the lower end. The stomach contained excess resting fluid. A sharply demarcated constricting band was seen passing horizontally round the lower part of the body of the stomach. Distal to this the pyloric antrum was seen to be narrowed and its outline was slightly irregular. The barium shadow ended distally in a smooth convexity directed backwards and to the right (Fig. 2). Every effort was made to identify the pylorus and duodenum. However, this was not possible. No peristalsis was observed in the stomach. The gastric mobility appeared normal. At four hours no barium had left the stomach, and it was decided to remove most of it via the gastrostomy tube to avoid the danger of aspiration into the lung. Re-examination next day, at approximately 20 hours, showed there was a small amount of barium in the transverse colon, and some still remaining in the stomach. The stricture was seen at this time, as the stomach was filled with air (Fig. 3). From these investigations it was thought that there was a well-defined constricting fibrous band passing round the body of the stomach horizontally. There also appeared to be fibrosis and narrowing of the stomach distal to this stricture, with almost complete stenosis in the region of the pylorus.

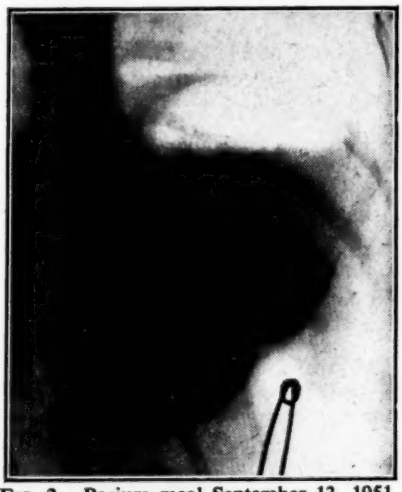

FIG. 2.—Barium meal September 13, 1951. Stricture of body of stomach, narrowing of pyloric antrum, and pyloric stenosis.

FIG. 3.—Barium meal 20 hours after Fig. 2. Air content of stomach demonstrates stricture and narrowing of pyloric antrum. Small amount of barium in transverse colon.

On September 15 jejunostomy was performed, and three hours later hourly feeds were started through the tube. In the next three days he gained 11 oz. (312 g.) in weight, and his general condition was somewhat improved. However, subsequent to this the child's condition gradually deteriorated, and he died on September 20.

Necropsy (Dr. Keith Simpson).—Forty hours after death. Body in a poor physical state, with considerable loss of flesh and marked dehydration. Recent operations for both gastrostomy and jejunostomy completed successfully and without operative mishap—but with suppurative peritonitis ensuing after the second of these procedures. No residual corrosive change at the lips or in the glottis and no mechanical obstruction to the cardiac orifice. Liver showed mild toxic change only. Some excess mucus and oedema fluid was found in the bronchial tree, but no pneumonitis nor pulmonary collapse was seen. There was early extension of infection into the right pleural sac from the peritoneum. In the stomach there was remarkable thickening of the wall by scar tissue extending distally from the lower third of the body. A broad band of scar tissue contracted the pyloric antrum transversely, and thickening of the wall extended into the pyloric sphincter. In the scarred area there was distortion and narrowing of the gastric lumen.

The cause of death was acute suppurative peritonitis following jejunostomy for obstruction to the stomach by scarring due to poisoning with compound ferrous sulphate tablets.

Discussion

Very few cases of pyloric stenosis and fibrous stricture of the stomach due to the ingestion of poisons, without producing concomitant fibrous stricture of the oesophagus, can be found in the English literature, but apparently such cases are more common in foreign countries. Cases have been reported due to the following causative agents : sulphuric acid (Halstead, 1919); hydrochloric acid (Schulenburg, 1941 ; Joll, 1941) ; formaldehyde (Vinson and Harrington, 1929); tincture of iodine (Wilensky and Kaufman, 1939); and lysol (Grey Turner, quoted by Schulenburg, 1941). Very recently a case has been reported of pyloric stenosis arising in a 3-year-old boy about one month after swallowing 67 compound ferrous sulphate tablets (Crosskey, 1952).

Compound ferrous sulphate tablets consist of ferrous sulphate 3 gr. (0.2 g.), copper sulphate 1/25 gr. (2.6 mg.), and manganese sulphate 1/25 gr. (2.6 mg.), usually coated with sugar and coloured bright green. Somers (1947) and Forbes (1947) have shown that the ferrous sulphate is the lethal agent, the small amounts of copper and manganese making no difference to the toxicity of the tablets. Forbes (1947) and Spencer (1951) have independently suggested that the ferrous sulphate is converted in the stomach into ferric chloride, the latter producing the main local lesions.

Twenty cases of poisoning with compound ferrous sulphate tablets in children have been reported in the literature so far. Of these, 10 (50%) have recovered, all apparently remaining symptom-free after discharge from hospital, and 9 (45%) have died within two and a half days. One case (5%) recovered, but subsequently developed pyloric stenosis. Nearly all these patients vomited after taking the tablets, but 66.7% of those that died had haematemesis or blood in the stomach washings, compared with only 30% of those that recovered without sequelae.

Experimental work by Somers (1947) and Forbes (1947) in animals has demonstrated that the gastric changes are roughly proportional to the size of the dose for each species. In children the gastric appearances at necropsy have been consistent and similar to those found in the experimental animal. In children there is an area of haemorrhagic gastritis with oedema (Prain, 1949) situated in the middle third of the stomach near the greater-curve side and involving both walls. A less degree of similar reaction extends over the rest of the stomach. Microscopy shows oedema of the submucosa, necrosis of the mucous membrane, vascular thrombosis, and impregnation of the mucosa and vessel walls with iron. Forbes (1947) and Spencer (1951) emphasize the haemorrhages that occur into the stomach wall.

It is unfortunate that the stomach in the present case was not examined histologically. It is evident, however, from the accounts given of similar cases and experimental work in animals that the process of repair following the intense haemorrhagic gastritis, if given time, would lead to fibrous contracture of the pyloric antrum and pyloric stenosis. This fibrosis may also be increased by superficial peptic ulceration and subsequent scarring following the shedding of the gastric mucosa. In fact, the development of the fibrous reaction in the submucosa and muscular coat of the pylorus was noted in the biopsy specimen in Crosskey's case (1952).

In the present case the rapid development of the fibrous stricture of the pyloric antrum and the pyloric stenosis can be seen by comparison of the two barium-meal examinations done 16 days apart. This clearly excludes a congenital abnormality.

Summary

A case of pyloric stenosis and fibrous stricture of the pyloric antrum developing in under two months in a child after swallowing compound ferrous sulphate tablets is described. Death was due to acute suppurative peritonitis following jejunostomy.

The literature on ferrous sulphate poisoning and fibrous stricture of the stomach due to the ingestion of corrosive poisons is briefly reviewed.

My thanks are due to the physicians and surgeons under whose care the patient was at Hammersmith and Margate Hospitals for permission to publish the case, to Dr. J. Duncan White and Dr. J. P. Thierens for permission to use the radiographs, to Dr. Keith Simpson for his necropsy report, and to Mr. Basden for the reproductions of the radiographs.

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METHOD OF PREVENTING INSULIN ATROPHY

BY

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Many theories have been put forward to explain the development of fat atrophy occurring at the site of injection of insulin in some diabetic patients, and in our opinion no better summary of these views has been given than that of Marble and Smith (1942).

During an extensive survey of 57 cases of insulin atrophy occurring in this clinic it occurred to us that, whatever the exact mechanism of its production, the high local concentration of insulin at the site of injection is probably a significant factor. Dispersal of this concentration seemed to be a logical step towards lessening or preventing such atrophy.

The use of hyaluronidase as a spreading agent suggested itself. The obvious danger was too rapid absorption of insulin into the blood stream, with consequent hypoglycaemia. Several stabilized diabetics in hospital, not showing insulin atrophy, were therefore given their usual doses of insulin with added hyaluronidase. No appreciable change was found to occur in their diabetic control. No hypoglycaemia was observed, whilst, on the other hand, there was no evidence that the insulin was rendered ineffective. In studying the control of diabetics by the inunction of an insulin hyaluronidase mixture, Bresgen and Heinlein (1951) also found that the insulin was not inactivated.

Accordingly, in 1951 three children who showed marked atrophy at whatever site insulin had been given were chosen for a trial. They lived in a home for diabetic children attached to the National Children's Home at Frodsham, Cheshire, and their diabetic condition was under constant supervision by trained nursing staff. Areas in which insulin had not been previously given were chosen in each child for regular injections of an insulin–hyaluronidase mixture, and injections have since been confined to these new sites.

The insulin–hyaluronidase mixture was made daily by dissolving 3 mg. of hyaluronidase in 400 units of soluble insulin (80 units per ml.). From this mixture the individual doses were drawn up. This addition of hyaluronidase to insulin did not produce any alteration in their diabetic control, and injections of the mixture caused no more discomfort than had injections of insulin alone.

Case Reports

Case 1.—A girl born on December 3, 1938, had been a diabetic since 1944. She was first seen by us in September, 1950, when she showed insulin atrophy in both arms and both thighs. Her parents stated that the atrophy developed in the arms in about six months and in the thighs in about four and a half months after beginning insulin injections. Her diet contained 250 g. of carbohydrate daily up to May, 1952, since when she has had a "free diet." Injections of soluble insulin twice daily from September, 1950, to February, 1951, in the arms and thighs greatly increased the atrophy already present. Though she has had no more injections in the arms and thighs since February, 1951, the atrophy remains unchanged. From March 1, 1951, to January 27, 1953, the insulin–hyaluronidase mixture was given into the buttocks only. The total daily dose varied during this period from 72 to 88 units. No subcutaneous atrophy of the buttocks has developed from the use of this mixture.

Case 2.—A girl (born September 15, 1943) had been a diabetic since 1948, and was first seen by us in August, 1950, when she showed marked insulin atrophy of both arms and both buttocks. We were informed by her parents that insulin atrophy was "very bad" in the arms within about nine months of starting insulin injections. Her diet contained 160 g. of carbohydrate daily at first; it being increased to 235 g. at present. From March 1, 1951, to October 28, 1952, the insulin–hyaluronidase mixture was given into the anterior abdominal wall only. The total daily dose varied during this period from 64 to 68 units. No subcutaneous atrophy of the anterior abdominal wall has developed.

Case 3.—A boy (born September 4, 1941) developed diabetes mellitus in 1949, and was first seen by us in May, 1951, when insulin atrophy was present in both arms. At that time his diet contained 190 g. of carbohydrate daily, and this has gradually been increased to 250 g. daily. Injections of soluble insulin were given twice daily, into the left thigh only, from May 26 to November 20, 1951, the total daily dose varying between 84 and 45 units. Atrophy was then observed to have developed at this site. Since November 21, the insulin–hyaluronidase mixture has been given into the right thigh only. The total daily dose has varied between 48 and 56 units. The mixture has been used for 16 months up to March 20, 1953, and has produced no atrophy in the right thigh.

Discussion

It would seem from our observations in these three cases that the addition of hyaluronidase to insulin has prevented atrophy developing, whereas, with insulin alone, atrophy

had appeared in a few months in each case. The chief benefit from the use of this method, if its value is confirmed, would appear to lie in the alleviation of this unsightly effect of insulin therapy, which so commonly occurs in children and young women. Among 20 diabetic children at this home, insulin atrophy has occurred in 10 (50%).

There are, however, some practical points for consideration before the method can be applied to the routine outpatient treatment of diabetics. At present we believe that the insulin–hyaluronidase mixture must be freshly prepared each day, as its spreading action begins to diminish after eight hours. A more stable preparation would have obvious advantages. Further, it is probable that we have been using an excessive amount of hyaluronidase.

Summary

Three cases are described in which an insulin–hyaluronidase mixture has prevented the onset of insulin atrophy.

The practical difficulties in the giving and preparation of this mixture are discussed.

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Medical Memorandum

A Case of Friedländer's Pneumonia Treated with Aureomycin

The incidence of Friedländer's pneumonia has been estimated as 0.8 to 4% of all pneumonias. Rosenthal (1949) points out that these figures are probably too high, as it is only the severe pneumonias which are admitted to hospital.

Before the introduction of the sulphonamides the mortality was approximately 80%. With their advent it fell to 60%, only to rise again when they were gradually replaced by penicillin —which is almost completely ineffective against this organism—as the treatment for all types of pneumonia. Gill (1951) believes that penicillin may actually be harmful, stating that all his patients treated with penicillin alone died. In the days before any specific treatment was given, 20% recovered. He suggests that this may have been due to the penicillin killing susceptible organisms, thereby giving the Friedländer's bacillus a free field.

Streptomycin has proved more valuable than the sulphonamides, and some encouraging reports have been published (Barber and Grant, 1952). However, as this condition can become chronic, and as the dosage of streptomycin needed may be high, complications of treatment may arise. Furthermore, strains exist which are resistant to streptomycin, so that some other antibiotic may be necessary. This is a report of such a case, in which aureomycin proved effective.

CASE REPORT

On January 17, 1951, a married woman aged 40, who had previously enjoyed good health and who was seven months pregnant (para 8) developed a "severe chill." She was attended by her doctor, who diagnosed influenza, which was at that time epidemic in Dublin. On January 19 she had a spontaneous precipitate delivery in the toilet. The next day she was admitted to the Mater Nursing Home under my care, her doctor having found evidence of consolidation in the upper lobe of the left lung. On admission this finding was confirmed, and she was noted to be extremely dyspnoeic. She was given oxygen, and started on penicillin and streptomycin in heavy dosage. Twelve hours after admission the cyanosis was less, but she complained of intense chest pain, which was not completely relieved by morphine. She was now coughing sputum which resembled tomato sauce in consistency and colour.

On examination the whole left lung was found to be consolidated. Toxaemia was marked and restlessness was extreme. The nature of the sputum, the degree of toxaemia, and the complaint of intense pain suggested a diagnosis of Friedländer's pneumonia. Aureomycin, 500 mg. every six hours, was begun. Bacteriological examination of the sputum was not possible until January 22, when a culture gave the following results: "Organisms were present in scanty numbers only. A growth of Gram-negative bacilli of the Friedländer group was obtained. The sugar reactions were characteristic." These organisms were subsequently demonstrated to be resistant to penicillin and streptomycin, but sensitive to aureomycin. On the same date the white cell count was 14,000 (74% polymorphs).

During January 22 and 23 there was a slight improvement in the clinical condition. Toxaemia was less but the cyanosis was still pronounced. *X*-ray examination showed involvement of the whole left lung.

On the night of January 24 the patient, after a bout of coughing, complained of an empty feeling in the left chest. When seen a few hours later she was found to have a left pneumothorax.

On the morning of January 25 fluid was present in the left chest. Culture of this fluid showed a heavy growth of Gram-negative organisms of the Friedländer group. This organism displayed the same sensitivity characteristics as that isolated from the sputum. *X*-ray examination showed almost complete collapse of the left lung with a fluid level in the fifth space.

Oral aureomycin was continued. In addition, the pleural cavity was aspirated daily and 100 mg. of aureomycin (intravenous preparation) was injected intrapleurally. In spite of these measures the pus remained thin. An intercostal drain was then inserted and permanent underwater drainage was established (Mr. E. O'Malley).

Regular intrapleural aureomycin was continued for many weeks, without rendering the pleural fluid sterile. The lung displayed little inclination to expand, although the quantity of fluid in the chest was gradually diminishing. It was considered that gross pleural thickening had occurred, and that spontaneous expansion was unlikely. On March 14 Mr. M. D. Hickey was consulted and the patient transferred to Rialto Chest Hospital on March 19. Daily aspiration of the pleural cavity was continued until April 17, when decortication was performed by Mr. Hickey. The operation was followed by almost complete expansion of the lung, with the exception of a small pocket in the lower anterior chest. This pocket was aspirated repeatedly.

By the end of May the sputum had decreased in amount and it had become increasingly difficult to aspirate any fluid from the pocket. During this time physiotherapy was carried out in an effort to promote complete expansion. On May 30 4 oz. (110 ml.) of very offensive sputum was coughed up; in this way her empyema pocket was emptied through a bronchial fistula. The amount of sputum immediately fell to a trace, and further attempts at aspiration of the pleural cavity were negative.

She seemed now to have achieved good expansion, although there was radiological obliteration of her left base, due to pleural thickening. Her general condition was excellent, and she was discharged from hospital on June 20.

When last seen (April, 1952), aeration of the left lower lobe seemed complete. She felt very well and had resumed her household duties.

I wish to record my thanks to Mr. M. D. Hickey and the other members of the staff of Rialto Chest Hospital, Dublin, for their assistance in the management of this case.

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Reviews

AVIATION MEDICINE

Human Factors in Air Transportation: Occupational Health and Safety. By Ross A. McFarland, Ph.D. Foreword by Brigadier General James S. Simmons, Dean of Harvard School of Public Health. (Pp. 830; 155 illustrations. $13.00 or £5 6s. 6d.) London and New York: McGraw-Hill Book Company. 1953.

The author of this book is associate professor of industrial hygiene at Harvard and during the past 20 years has had extensive experience, not only of industrial hygiene, but also of aviation, particularly as applied to commercial flying on a global basis. He has been fortunate in his contacts with various international authorities in aviation medicine, both in civil and Service circles, and many of the statistics and views expressed in this book have been compiled from their publications and reports, as well as from proceedings of conferences, congresses, and meetings which he has attended. This help of associates he generously acknowledges in the preface. There is, understandably, a natural tendency throughout to accentuate the American viewpoint, which at times is not in accordance with the concept on this side of the Atlantic. But this may do good by helping to stimulate fresh thoughts and researches and so help on progress.

This voluminous book is profusely illustrated and adorned with a plethora of statistical tables. It contains a wealth of information on most aspects of medicine in its broadest sense as applied to aviation, especially in the realm of commercial flying. Reading is heavy going, but fortunately each chapter has a good summary and an extensive bibliography. The subjects discussed include the physical and psychological selection and the maintenance of efficiency of aircrew and ground staff; the training of aircrew; operational fatigue; ageing and efficiency; survival and rescue; the sanitary and quarantine control of airports and aircraft; the care and comfort of passengers and the transport of invalids; and the organization of an airline medical service.

Some of the statistics are not convincing. For example, those on the sickness and accident incidences of aircrew are based on the records of one airline only for a solitary year, and those concerned with the relative personnel strengths and cost of the medical services of various airlines are not comparable since the commitments differ so widely. Certain airlines provide medical services only for contract staff, some provide for both contract and local staffs, while others go further and give cover to wives and families. Moreover, the costs vary greatly, depending on the countries concerned along the routes.

Several subjects are considered in two or more places, and sometimes opinions expressed are contradictory. Thus, in considering whether aircrew who suffer from diabetes mellitus should be permitted to fly operationally, the author states on page 243, "An airman with diabetes mellitus is considered a hazard and should be disqualified from operating aircraft," whereas on page 265 he says, "Pilots suffering from diabetes should not be allowed to fly if they require insulin to control the disease." The latter view is contrary to the medical requirements as laid down by the International Civil Aviation Organization, which clearly state, "Proven cases of diabetes mellitus should be assessed as permanently unfit." This requirement applies to all licensed aircrew—pilots, navigators, engineers, and radio officers. Again, in discussing the important subject of antimalarial drugs for prophylaxis, there is a vague statement in Chapter 13 that "Chloroquine and Paludrine, developed during the war, may have several advantages over Atabrine," despite the opinion, expressed in Chapter 5, which reads as follows: "Paludrine is a widely used antimalarial drug. It has been used with good results and does not produce disturbing side effects or a discoloration of the skin. It is effective both as a prophylactic and as a means of attenuating the disease. For these various reasons, aircrews are more inclined to follow out the instructions for using it prophylactically on entering malarial areas." Incidentally, although there are 103 bibliographical references to Chapter 5, there is no reference to the classic wartime researches of Hamilton Fairley, which clearly showed the value of paludrine (proguanil) as an antimalarial.

Anyone reading the sections on tropical medicine would not be made aware of the part played by European workers in this field, especially in Africa and Asia, to which so much reference is made. The Belgian, British, Dutch, French, German, and Italian schools of tropical medicine have contributed so much to the elucidation of problems of aetiology, prevention, and treatment of tropical diseases that due credit should have been given to their work. This failure to refer to important findings of pioneers in aviation medicine occurs in other sections. For instance, in discussing the pre-war researches into psychological selection tests for aircrew, no reference is made to the work of Bartlett and his colleagues or to the valuable sensori-motor apparatus to test co-ordination of limbs and eyes which was developed and assessed by Schuster and Williams. Further, there is no reference to Treadgold's findings on body-build and fitness for aircrew duty, or to the pioneer and outstanding work of Clements and Livingston on the subjects of heterophoria, binocular vision, and depth perception, or to Livingston's wartime researches on, and tests for, night vision.

This is the most comprehensive book available on aviation medicine as applied to commercial flying and should prove valuable as a work of reference by those engaged in airline operations. As a textbook, it is likely to be heavy going for the student.

H. E. WHITTINGHAM.

SURGERY OF THE PANCREAS

Surgery of the Pancreas. By Richard B. Cattell, M.D., and Kenneth W. Warren, M.D. (Pp. 374; 100 figures. £2 10s.) Philadelphia and London: W. B. Saunders Company. 1953.

This is one of the most important surgical works that have appeared for some time. During the past 20 years, in which the surgery of the pancreas has been developed from an occasional adventure to a reasonably safe procedure, Richard Cattell has been entrusted with the greater part of the pancreatic surgery reaching the Lahey Clinic. He has probably done more pancreatic resections, and with more success, than anybody in the world, and he writes with authority and with a commendably balanced outlook.

One hundred and two pancreatic resections have been done at the clinic, with thirteen post-operative deaths. Eighty-eight of these operations were for cancer, with twelve deaths, a mortality of 13.6%. Cattell's analysis of this experience is instructive. He finds, for instance, that painless jaundice, which is usually considered the hallmark of cancer of the head of the pancreas, is the exception rather than the rule. Jaundice was present in all but three of the resectable cases, but it was painless in 22 only; indeed, pain was the commonest symptom and usually preceded the jaundice. The marked difference in symptomatology and in ultimate prognosis between cancer arising in the parenchyma of the head and cancer arising in the ampulla is well brought out. Forty-six patients with cancer of the head underwent resection, with a mortality of 17.3%; of these, two survived five years. Thirty patients undergoing resection for cancer of the ampulla had an operative mortality of 6.6%, and, of these, fifteen are now alive, three having survived over eight years. Pancreatico-duodenectomy for cancer of the head is now only proceeded with if it is clear that the growth nowhere involves the vena cava, the portal vein, or the superior mesenteric vessels.

The book is by no means limited to a discussion on cancer. The anatomy and physiology of the pancreas, congenital malformations, acute and chronic pancreatitis, pancreatic cysts, operative and traumatic injuries, and islet-cell tumours are all discussed fully. Chapter IV, on chronic relapsing pancreatitis, has more than 50 pages and 20 illustra-

tions on this highly important topic. Relapsing pancreatitis, like hiatus hernia, is a disease that has probably been with us undiscovered for many years. With a better knowledge of its symptomatology and augmented diagnostic facilities it is being recognized with increasing frequency as responsible for pains that have hitherto defied explanation. The writing is clear. The illustrations are excellent, for they are all well reproduced, and not one is superfluous. Altogether this is an admirable book.

HENEAGE OGILVIE.

THE ENDOCRINE ANGLE

Endocrine Treatment in General Practice. Edited by Max A. Goldzieher, M.D., and Joseph W. Goldzieher, M.D. (Pp. 474. £3 3s.) New York: Springer Publishing Company, Inc. London: Lange, Maxwell and Springer. 1953.

The title of this book is well chosen, since it is indeed about *general* practice and is not confined to the so-called endocrine diseases. The introduction of cortisone and A.C.T.H. has led to the treatment, with varying success, of many diseases with these drugs, and most are considered in the present volume. The introduction states that the book is intended to give the reader information of the type he might wish to obtain from a consultant at the bedside. Throughout, the consultant is an endocrinologist and continually the question is answered, "What is the endocrine angle on this patient?"

There are good sections on treatment of diabetes mellitus, on male and on female hypogonadism, and on male and on female sterility. Most diseases are grouped under systems such as gastro-intestinal, central nervous, musculo-skeletal, and so on. But the continual stressing of hormone therapy leads not infrequently to a distortion of emphasis, since the endocrine aspect is sometimes slight. The advised treatment of paroxysmal tachycardias wisely avoids endocrines and follows orthodox lines. But the first sentence in the section on constipation tells us that sluggish bowels are a symptom of many endocrinopathies, of which hypothyroidism is the most common. The section on diarrhoea starts with the statement that this is one of the classical symptoms of Graves's disease. Even abdominal pain is considered from the endocrine viewpoint, although we are warned that all possible organic causes should first be eliminated. Abdominal pain is common in the hypogonadal woman, in whom it is often of neurotic origin. But it may apparently also be due to hypocalcaemic hyperphosphataemia. The general clinician is not told how to deal with this abnormality.

The book yet contains a large amount of information. The authors are very enthusiastic about hormones and give much sound advice on prescribing them. Perhaps it is a pity there are no references. One would like to know, for instance, the evidence for advising cortisone in cases of high altitude sickness. The book will be welcomed by makers of endocrine products, but we hope that general practitioners do not often ask themselves the question, "How can I treat all my patients with endocrine drugs?" But that is the question the book tries hard to answer.

C. L. COPE.

PSYCHOLOGY OF CHILDREN

Childhood and Society. By Erik H. Erikson. (Pp. 398. £1 5s.) London: Imago Publishing Co. 1951.

Here is that rare thing, an American non-medical psychoanalyst. The author comes to psychology from art, and so (as he says) he bases his work "on representative description rather than on theoretic argument." This leads him to some reformulations of theory (infantile sexuality, the "eight stages of man") in a way that is interesting yet not compelling. One does not feel like learning or teaching his way of thinking, but nevertheless feels stimulated by a fresh presentation. The rest of the book makes the reader get to like the man and his clinical approach. The main theme is the interrelationship of individual emotional development and the patterns of society in which the child grows up. The argument is developed without loss of respect for the individual's own developmental process.

The author has been sensitively in touch with various social groups. Two are contrasted: the Oglala sub-tribe of the Sioux, who live in the Pine Ridge Indian Reservation, South Dakota, and the Yurok, a tribe of fishermen and acorn gatherers on the Pacific coast. Here is good clinical material which adds on well to the descriptions of ordinary neurotic and psychotic children with which the study starts.

Erikson has much that is important to say about ego development. He discusses at length toys and the playing of children. About the causation of psychosis he remarks (p. 181): "The truism that the original problem is to be found in the mother–child relationship holds only in so far as one considers this relationship an emotional pooling . . . the primary deficiency in 'sending power' was in the child." This is a good way of putting the matter, but the reviewer has held the view that the original deficiency was usually in the total mothering-system, if not in the mother herself, and in the initiation of the presentation to the new individual of external reality. Both extremes must be allowed for, as well as an admixture of the two.

The book ends with studies of the childhood of Hitler and of Maxim Gorky. Surely this book justifies the training of some psycho-analysts from non-medical fields of study and experience, as is the practice in this country.

D. W. WINNICOTT.

ISOTOPES IN BIOCHEMISTRY

Isotopic Tracers in Biochemistry and Physiology. By Jacob Sacks, Ph.D., M.D. (Pp. 383. £3 8s.) New York and London: McGraw-Hill Book Company. 1953.

As a survey of the investigation of metabolic processes by means of isotopes, Dr. Sacks's book is of very considerable value and would be important if only for its bibliography, which contains about 700 references, mainly covering the period until 1950 but with some 120 of subsequent dates. Throughout this major biochemical section of his book Dr. Sacks is concerned to discuss how far the isotope techniques are valid or crucial, or are alternative or inferior to other procedures. His analysis of these points and of general principles is consistently critical and penetrating; and his writing is lucid, compact, and comprehensive in his surveys of carbohydrate, lipid, protein, and steroid metabolism. The introductory sections on physical measurement are useful, although that on the safe handling of radio-isotopes is somewhat unreal. Good descriptions are also given of problems of diffusion, calcification, and blood formation.

As the title indicates, this book is not primarily concerned with clinical applications, and it is perhaps unfortunate that authors still attempt to cover so many aspects of isotope work in books on any one field of application. Certain clinical uses are discussed here, but the opinions that the author expresses on their application are often slight and potentially misleading. I have the impression that the author is taking too great care to avoid any overstatement of the value of isotopes; and it is understandable that he should sometimes seem too disparaging. These defects, however, are incidental to the declared purpose of the book, to "discuss the principles involved in the use of isotopic tracers and . . . some of the limitations inherent in their use," and this has been thoroughly well and carefully done, and amply illustrated.

E. E. POCHIN.

A second edition has recently been issued of the *Textbook of Physiology and Biochemistry* by Professors G. H. Bell, J. N. Davidson, and H. Scarborough (E. & S. Livingstone, 50s.). Dr. Bruce Williamson's *Handbook on Diseases of Children* has been thoroughly revised for the seventh edition (E. & S. Livingstone, 21s.). Much new material has been added to Professor Boyd's *Textbook of Pathology* for the sixth edition (Henry Kimpton, 88s.), and several sections have been wholly rewritten.

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THE PREVENTION OF INFLUENZA

Since the first isolation of influenza virus in 1933 many attempts have been made in this country and in the United States to make vaccines giving satisfactory protection against the disease. The results of the early trials of these vaccines were contradictory: a vaccine might afford good protection in one epidemic and yet prove almost valueless in the next. It is now believed that the inconsistent results were mainly due to two factors—lack of knowledge about variations in virus strains and lack of adequate control of the field trials. Until recently the available laboratory methods for the study of the antigenic nature of influenza viruses seemed to show that the virus produced a succession of mutants with new antigenic characters which enabled them to overcome immunity remaining in the population from previous epidemics. With the development of new techniques for the preparation of strain-specific sera an alternative concept of the nature of antigenic variation in the influenza virus has been gaining ground. When the Section of Epidemiology and Preventive Medicine discussed this subject last week at the Royal Society of Medicine, Professor T. Francis, jun., of Ann Arbor, described some of the results of work in his laboratory with absorbed sera. He believes his findings support the theory that the influenza virus antigens are finite in number and that strain differences may be due to variations such as in arrangement or quantity of these antigens rather than to the sudden appearance of completely new antigens. This work is still in an early stage, but if the concept remains acceptable it offers great promise for the future of influenza vaccines.

The second defect of some early vaccine trials was lack of adequate control, and in the opening pages of this issue the first report of the Medical Research Council's Committee on Clinical Trials of Influenza Vaccine is published. During the winter of 1951–2 the committee set up a preliminary trial to obtain serological evidence about the effect of a number of vaccines, and to provide experience in the methods for recording illness. This was followed by a carefully controlled trial of a suitable vaccine during last winter. Some 12,000 volunteers in centres scattered throughout the British Isles and representing several different groups in the population were inoculated with either an influenza vaccine or a control bacterial vaccine. Care was taken to ensure random distribution of the vaccines, and the observers recording illness did not know which vaccine was received by individual subjects. Any difference between the vaccine and control groups could therefore be assumed to be the result of the vaccine. There was a significant reduction of influenzal illness in the group receiving the influenza vaccine, but no great difference between the groups in the incidence of other respiratory illness—a finding which confirms the belief that the groups were alike in every respect except for the vaccine. There seems little room for doubt that the reduction in influenzal illness among the volunteers who had been inoculated with the influenza vaccine was the direct result of the vaccine.

Many general practitioners will be surprised at the low incidence of influenza among the volunteers in the control groups, and it is possible that the criteria for diagnosis were too strict. Influenzal illness during the past winter was remarkably mild compared with that in many previous influenza A epidemics, and it may have been that a large proportion of sufferers continued at work and thus escaped the suspicion of infection. The report from the Public Health Laboratory Service published elsewhere in this issue shows that the epidemic of influenza A may not have reached many trial centres till almost three months after the vaccines had been administered, and experience suggests that the protective effect of the vaccine may have fallen considerably during the interval. The low incidence of illness and the generally long interval before volunteers were exposed to risk of infection were unfortunate from the point of view of those who designed the trial, but could hardly have been allowed for. In these difficult circumstances a 40% reduction in illness in the group receiving influenza vaccine must be considered a reasonably satisfactory result.

At the Royal Society of Medicine discussion last week one speaker expressed doubts about the application of serological methods to the assessment of a vaccine, and it is probably wise to make the assessment clinically at present. But full use of the laboratory can be made both for the control of variations in clinical diagnosis between different observers and different centres, the non-vaccinated group being used for this purpose, and as a means for excluding other known diseases which might in both the control and vaccine groups give rise to clinical signs and symptoms resembling those of influenza A. Epidemics of influenza A are generally fairly sharply defined in time, and exclusion of cases outside the epidemic period would probably prevent a certain

amount of dilution of the figures due to erroneous diagnoses occurring during the non-epidemic period.

Information about the presence of influenza virus A infections during the trial period was largely provided by the laboratories of the Public Health Laboratory Service, whose staff, as can be seen from the reported printed at page 1178, worked closely with clinicians and medical officers of health. Particular credit must be given to the general practitioner "spotters," who must have found it difficult to observe the exacting precautions necessary in obtaining specimens for virus tests. In previous years detailed epidemiological conclusions on the origin and course of epidemics in this country have necessarily been somewhat speculative, because of the lack of laboratory information. This lack of information was particularly unfortunate in 1951, when viruses of two different groups were present and probably caused illnesses with different degrees of severity. The figures of the Ministry of National Insurance and Pensions provide an accurate measure of the spread and extent of influenzal infections, but without support from the laboratory these figures lose much of their value from the epidemiological point of view.

Many of the problems of influenza epidemiology will probably remain unsolved until much more detailed information of the type collected by the Public Health Laboratory Service has been accumulated and correlated with information from other sources. An alternative approach to the epidemiology of influenza was described by Professor C. H. Stuart-Harris at the meeting of the Royal Society of Medicine already mentioned. He tested sera which had been collected for other purposes for their content of antibody to influenza virus soluble antigens, and showed the value of this method in tracing the appearance and progress of the virus in a community. This method might avoid some of the inevitable defects of an investigation such as that conducted by the Public Health Laboratory Service, but to provide useful information many specimens of sera would need to be tested. None of the methods used at present for the study of influenza epidemiology can give the whole picture, which is likely to emerge only when every source of information is used to the best advantage.

ACCIDENTAL POISONING OF CHILDREN

The accidental poisoning of children seems to be increasing in frequency, and, since most of the poisons are medicines of various kinds, these accidents are of particular interest to doctors. In England and Wales the age at which accidental poisoning is commonest is 1–2 years. In 1950 and 1951 combined there were 53 deaths from that cause among these young children. The number is not large, but it is not far short of the 58 deaths due to influenza (including influenzal pneumonia), and 1951 was an epidemic year for that disease. J. O. Craig and M. S. Fraser have recently investigated[1] the accidental poisoning of children in Scotland, and they found that among children attending two Scottish hospitals accidental poisoning has become much more frequent in the last twenty years. The evidence was not conclusive that this corresponds with a true increase of cases in the child population, but there seems to be no doubt of a sharp increase in the frequency of cases there since 1948. Evidence from Manchester affords some confirmation of the trend.[2] Discussing the registered deaths from this cause in England and Wales of children aged 1–4, D. Swinscow[3] found no increase in frequency between 1931 and 1949, but he pointed out at the Annual Meeting of the B.M.A. this year, by which time later figures had become available, that the death rate showed a steady and notable inclination upwards from 1949 to 1951. The rise was particularly sharp when the death rate from medicaments was separated from that for all poisons, for the death rate from non-medical poisons had declined somewhat.

The proportion of these deaths in England and Wales that are caused by medicaments as opposed to household and miscellaneous poisons has always been considerable and seems to be rising. In 1931–9 it was 52% ; in 1940–9 it was 62% ; and in 1950–1, the last years for which figures have been published, it was 80%. In the Scottish cases Craig and Fraser found that those due to medicines had recently increased much more than those due to household poisons. After allowance is made for the different ways in which these figures were obtained and categorized, it remains fairly certain that they signify an increase in the last few years—and one that seems likely to be continuing—of the frequency of cases and deaths due to accidental poisoning by medicaments in Britain.

When the drugs and other medicaments causing these deaths are looked at, they are at first sight rather surprising in that most of them are usually considered to be fairly harmless. This is because it is their effect on the adult, not on the child, that is usually thought of. The dangers of ferrous sulphate have now achieved some publicity, and Dr. F. G. M. Ross adds to it by reporting at p. 1200 of this week's *Journal* the death of a 17-months-old boy as the result of pyloric stenosis and gastric stricture. The child

[1] *Arch. Dis. Childh.*, 1953, **28**, 259.
[2] Holzel, A., and James, T., *Med. Offr*, 1951, **86**, 169.
[3] *Arch. Dis. Childh.*, 1953, **28**, 26.

swallowed only 6–12 tablets of ferrous sulphate, and vomited soon afterwards, but the tablets did serious and ultimately fatal damage to the stomach. Yet, even though deaths from this poison have been fairly well known for some years, ferrous sulphate caused the deaths of 17 children aged 1–4 in England and Wales in 1950–1. The antihistamines are now rapidly coming to the fore; they caused in this age group one death in 1948 (the first), four in 1949, six in 1950, and eight in 1951. Preparations of strychnine are also frequent causes of death, though it is not thought of as a dangerous poison because it is usually prescribed in small doses in tonics or, more rarely, laxative pills, neither of which types of preparation is handled in the home with much restraint. Aspirin has always been quite a common cause of poisoning in children, and methyl salicylate in liniments has been a serious danger in the past, though less so now.

In the prevention of these deaths the family doctor has an important part to play in warning parents about the dangers to their children of even apparently harmless preparations. Chemists, too, and other vendors of common poisons have a duty to their customers. There is also a strong case for legislation to compel the labelling of all these preparations as poisons, for that is what they are. These are preventive measures that could be taken in the light of what is now known about these deaths, but more needs to be discovered yet. In particular, the increasing frequency since 1948 is no doubt more difficult to explain than merely by pointing out that the Health Service began then. One effect of the Health Service seems to have been to bring medicaments into more homes than ever before, thus increasing the risk to children, and possibly larger quantities are prescribed than formerly, so that more is left over to lie around in the house. It is notable, for instance, that in all these years only one child in this age group died in England and Wales from a sulphonamide. One reason for this may well be that sulphonamide tablets are usually prescribed in fairly small numbers with the intention that they shall be taken in a specified course. Craig and Fraser show that tablets are a commoner cause of poisoning than liquids, and they are certainly more often prescribed than formerly, though not enough to account for the sharp rise in cases and deaths. We are still ignorant of some of the causes of these deaths, but this work does indicate the need for at least advice from doctors and sellers of poisons, and perhaps in addition the compulsory labelling as poisons of many common household remedies.

AGE AND WORK

While most people of working age still feel an obligation to care for their own children, many of them no longer feel obliged to support their blood relations at the other end of life's span. Aged parents and grandparents are left to fend for themselves in a manner that would have been thought shockingly callous 50 years ago, and probably few of its readers saw anything to question in a newspaper headline[1] that appeared last week—"Neglect of the Aged Sick: Welfare State Fails." The effects of this social trend, which seems to be increasing rather than diminishing, are exacerbated by that now well-known demographic change—the increase year by year of the proportion of old people in the population. In a paper appearing at p. 1190 of this week's *Journal* Dr. W. P. D. Logan discusses some of the population changes to be expected and in particular the occupational distribution of old people. At the outset he dispels a rather widespread misconception; it is that people are living to a much greater age than formerly, and it is even sometimes tendentiously expressed as a criticism of medical science for prolonging into a miserable senility the lives of people who would prefer to shuffle off this mortal coil. In fact, however, the expectation of life of a person aged 60 has hardly changed in the last 100 years. It is the expectation of life of young people that has so greatly increased, with the result that many more than formerly now reach the age of 60; but, having reached it, they will on average live only a year or two longer than their great-grandfathers.

It seems to be generally believed that men can work to a greater age in skilled occupations than in unskilled, and in light occupations than in heavy. Though this may be true in some respects, Dr. I. M. Richardson shows in an important contribution[2] that there is a considerable drift from skilled to unskilled work among older people, which sharply accelerates when the 40s are left behind. Though skill may sometimes diminish with age, its reduction does not seem to be a main cause of this drift. Rather do ageing people find their chief difficulty in responding quickly, and what often causes them more trouble than the physical exertion or the skill required to perform the job is the pressure of keeping up with the conveyor belt. Allowed to complete the task in their own time, they can carry it out with unimpaired skill. Again, there is nothing to be said for the common practice of looking on old people merely as retaining some of their faculties while others are gradually being dimmed. As Mr. A. T. Welford says in an article published at p. 1193 this week, while most of our scientific knowledge about ageing is of ways in which capacity and performance get worse with age, there are clearly ways in which age brings improvement, "such as steadiness of character, conscientiousness, and patience." These qualities have not yet proved

[1] *Manchester Guardian*, November 20.
[2] *Brit. J. industr. Med.*, 1953, **10**, 269.
[3] *National Advisory Committee on the Employment of Older Men and Women: First Report*. H.M.S.O. 1953.

to be amenable to scientific investigation, even though they are often apparent to good employers, but the inability to enumerate and measure them is no excuse for ignoring them.

At the opening of his study of the health of middle-aged and elderly people at work, Richardson refers in passing to the adage that occupation is the best medicine. This is most dramatically seen to be true when the age incidence and causes of suicide are examined. The average age at which suicide is committed has been rising in Britain since 1900, so that it has been becoming increasingly a disorder of elderly people; and Dr. I. R. C. Batchelor and Miss Margaret B. Napier conclude in an article appearing at p. 1186 that of outstanding importance among the causes of these suicides is a community attitude making the old person feel useless and unwanted. The people they studied commonly complained of feeling lonely, and these writers emphasize the need for people to continue an occupation for as long as possible, and to develop other interests too, so that they may continue to be a part of the community. But it seems to be rather important here to distinguish the economic from the therapeutic reasons for staying at work, for many ageing people look forward with a lively pleasure to retirement so that they can at last occupy themselves with something worth while. The right approach was taken in the recent report[3] of a committee appointed by the Minister of Labour when it recommended that people who can give effective service should have the opportunity to continue in work. The widespread desire to find ways and means of keeping old people employed is understandable in view of the rapidly mounting bill for old-age pensions—£238m. in 1948 to £501m. in 1978 at present rates—and the report points out that, if the skill of older people can be more fully used, the standard of living will be higher. But, when all is said and done, to anyone not wholly lapped in the Welfare State there must seem something incongruous in a generation which, ever demanding shorter hours of work, asks for its fathers' working days to be extended.

RESEARCH IN GENERAL PRACTICE

Research work under the conditions which obtain in most general practices can never be easy. It requires not only the impulse to continue routine work when the armchair beckons and the glass of sherry is waiting but also the capacity to pursue an objective which is unrelated to the demands of the daily round. It implies therefore not only unremitting industry but also the organization of the working day to give time for constructive thinking; more work on the one hand and more leisure on the other, and the family doctor may be pardoned for concluding that there never was a prescription more compounded of incompatibles. And yet this stimulus to the general practitioner to engage in research has come from his fellows and from others who sincerely wish him well. The inspiration for this movement towards research springs from two sources. The first is the recognition that there is an army of potential field-workers, as yet unengaged, who should be studying disease not only in the individual but also in the community. The second is the appreciation that such work would encourage some good doctors who have experienced frustration, resentment, and inferiority in general practice, especially those who work in the large towns and cities. The opportunity is undeniable, but the difficulties are great.

The College of General Practitioners has accepted the organization of general-practitioner research as one of its most important functions, and it has issued a first report in the form of a "Research Newsletter."[1] A research committee has been formed and a research register has been opened. A number of distinguished experts have agreed to serve on a panel which is prepared to advise individual general practitioners on the practicability of their research projects and the best method of conducting their investigations. At the first annual general meeting of the College on November 14 Dr. G. F. Abercrombie described the research committee's programme and mentioned[2] some of the investigations which were already under way. Members who are essaying a common task will be introduced to each other so that the available clinical opportunities will be multiplied and the individual will have the stimulus of working in a team.

The intention of the College is not to direct and control such research but to support and assist it by all possible means. The most fruitful research is done by men who are pursuing their own ideas—and also the most sterile. The rare men of genius, like Mackenzie and Pickles, will pursue their pioneering path alone, but the rest of us must be grateful for friendly counsel. Research is one of the few great words in science, and we must be careful not to debase our limited coinage. The family doctor is more likely to err on the side of humility than of arrogance, and yet his work, even if trivial and inconclusive, can bring him personal satisfactions akin to those experienced by Harvey, by Bernard, and by Pasteur.

The research methods employed by family doctors must be historical, observational, and statistical; experimental procedures will usually not be accessible to them. Investigations must necessarily be concerned with the common disorders such as cancer, cardiovascular degenerations, psychological disorders, and the virus diseases, and even in these common illnesses a combined study by a group of practitioners will be required if results of value are to be obtained. A small group of doctors working happily together and looking after a compact community of 20,000 people could, in the space of a few years, write anew the natural history of some virus diseases. How fascinating it would be to learn the course of herpes zoster in such a township—the incidence, the age groups, the nerves involved, the relationship to varicella, and the precipitating factors. General practitioners are likely to be the first to observe the ill effects of a new drug, and it is hoped

[1] *Practitioner*, 1953, **171**, 307.
[2] *British Medical Journal*, 1953, **2**, 1154.

that they may keep a sharp eye out for untoward reactions to, for example, antibiotics and record their observations. No other group in the profession has a comparable experience to draw upon.

TRANSPLANTED CARTILAGE

The use of implanted cartilage in plastic surgery has been the subject of two reports recently. Gibson and Davis[1] describe the use of preserved bovine cartilage in eighteen cases, and Schofield[2] gives a preliminary account of experience with preserved cadaveric human cartilage from a cartilage bank in seventy-four cases.

Stout[3] seems to be the first to have suggested, in 1933, the clinical use of transplanted bovine cartilage, but its use in Britain follows the advocacy of Wardill and Swinney[4] in 1947, and of Gillies and Kristensen[5] in 1951. As with bone grafts, the effectiveness of cartilage transplants does not depend on the survival of the cells of the transplanted tissue, and it is because of this that grafts from other individuals or even from other species can be of great use in reconstructive surgery. It is known from the work of Peer[6] that cartilage cells may survive for many years in autotransplants. But the survival of cartilage cells from other individuals of the same species (homotransplants) and from individuals of other species (heterotransplants) is transient and unimportant. Recent work by Laskin and Sarnat[7] has shown, however, that the enzymic activity of the transplanted tissue may continue for long periods, while the clinical accounts show that the transplanted tissue may maintain its volume for many months.

The literature contains an occasional suggestion of cell survival[8] or "restored viability of cartilage cells"[8] in transplants of preserved cartilage. These are certainly incorrect, and the usual finding—as is well illustrated by Gibson and Davis[1]—is a varying degree of breakdown of the intercellular material of the transplanted cartilage, and a penetration of its interstices by connective-tissue cells from the host.

That acquired immunity of the host is responsible for the increasingly rapid breakdown of successive foreign transplants was noted by Gibson and Medawar[9] in a clinical study of skin grafts. It was further demonstrated by Medawar's experimental work[10] on skin transplantation in the rabbit, and more recently by Dempster's experimental studies[11] on skin and kidney transplantation. Gibson and Davis[1] report a similar increase in the speed of absorption of successive bovine cartilage implants, and they ascribe this, too, to immune factors.

From all this work it appears that transplanted cartilage functions merely as a semi-inert foreign body with convenient mechanical properties. Already some synthetic plastics, including methyl methacrylate polymers, have been considered[12] as alternatives to cartilage. The physical properties of these materials can be readily controlled, and, once their biological "inertness" has been established, they would appear to offer many advantages.

1 *Brit. J. plast. Surg.*, 1953, **6**, 4.
2 Ibid., 1953, **6**, 26.
3 *Laryngoscope (St. Louis)*, 1933, **43**, 976.
4 *Lancet*, 1947, **2**, 389.
5 *Brit. J. plast. Surg.*, 1951, **4**, 63.
6 *Plast. reconstr. Surg.*, 1951, **7**, 6.
7 *Surg. Gynec. Obstet.*, 1953, **96**, 493.
8 Goldman, I. B., *J. Mt Sinai Hosp.*, 1950, **17**, 142.
9 *J. Anat.*, 1943, **77**, 299.
10 Ibid., 1944, **78**, 176.
11 *British Medical Journal*, 1951, **2**, 1041.
12 Holt, J. A. B., and Lloyd, R. S., *Arch. Otolaryng. (Chicago)*, 1948, **47**, 406.

MONKEY BUSINESS

The recent commotion in the daily press about the famous Piltdown remains was the sequel to an article[1] in the latest *Bulletin* of the British Museum (Natural History), the authors of which show beyond reasonable doubt that the Piltdown mandible and canine tooth are not genuinely fossil, but must be forgeries perpetrated about 1912–13 by some person unknown. The original cranial fragments are at the same time proved to be genuine, and possibly of Upper Pleistocene date.

The truth about the hoax, which seems likely to have been originally aimed solely at Charles Dawson, the finder of the Piltdown man, may never be known. Possibly its perpetrator intended at first to reveal the fraud after a short interval, but later, when even the experts accepted the specimens as genuine, took fright and dared not face what would have been the justifiable wrath of so many great men. However that may be, students of human pre-history feel a sense of relief that at long last an acceptable explanation has been found for the manifold problems raised by the Piltdown finds. No anatomist or palaeontologist to-day could regard without qualms a fossil man with a *Homo sapiens* cranium and the mandible of an ape. The usual refuge of the doubters—and they were many—has been to dissociate the jaw from the skull and thereby to evoke a fossil ape as well as the undoubted fossil man. This device did not recommend itself to palaeontologists and geologists in general, for fossil apes are unknown in Western Europe since the Lower Pliocene, perhaps 10 million years ago. The most recent opinion dates the Piltdown gravels to the last Interglacial, between 190,000 and 115,000 years ago. Unfortunately nobody followed up a clue that Waterston almost stumbled on a year after the discovery of the remains. He superimposed tracings taken from radiographs of the Piltdown mandible and of a modern chimpanzee's, showing that they were an almost perfect fit; and he concluded that it was as inconsequent "to refer the mandible and cranium to the same individual as it would be to articulate a chimpanzee foot with the bones of an essentially human thigh and leg."[2]

Having at last disposed of the need to find a fitting evolutionary niche for an apparently important, but none the less incongruous, *Eoanthropus dawsoni*, we may now breathe freely again. The young lady of Swanscombe[3] comes into her own as the undoubted earliest known human inhabitant of these islands, about 250,000 years old. Many have felt since her discovery in 1933 that the title was hers by right, but for others the Piltdown man has hitherto presented a bar to her succession.

1 Weiner, J. S., Oakley, K. P., and Le Gros Clark, W. E., *Bull. Brit. Mus. (Nat. Hist.)*, 1953, **2**, 141.
2 Waterston, D., *Nature*, 1913, **92**, 319.
3 Oakley, K. P., *Proc. geol. Ass.*, 1952, **63**, 271.

CLINICAL PATHOLOGY IN GENERAL PRACTICE

URINE TESTING IN THE SURGERY

BY

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This article is intended to describe as fully as possible, but without unnecessary elaboration, the procedure to be adopted in the examination of urine under the conditions normally present in the surgery. The tests chosen are those considered to be the most informative and selective. Practically all the tests are qualitative and they are often described as simple, but it is important to realize that this is no reason for doing it in a careless or haphazard manner. Experience will soon show that a test done with care gives a result which so far as the test goes is satisfactory; whereas a test made without such care often gives a result which leaves the practitioner in doubt, and he then embarks on a series of repeat or confirmatory tests, wasting time and destroying his confidence in the original test. This means that without necessarily employing precise measurements it is essential to keep as closely as possible to the prescribed quantities and conditions.

Necessary Apparatus and Reagents

Apparatus.—Tapered urine glass to hold about 6 fl. oz. (170 ml.); a microscope having ⅔-in. and ⅙-in. (1.7-cm. and 0.4-cm.) objectives; a supply of glass slides and coverslips; dropping pipettes with rubber teats; a small electric or hand centrifuge carrying 10-ml. tapered glass centrifuge tubes is a great asset but not absolutely necessary; urinometer reading from S.G. 1000 to 1060; a plentiful supply of clean test-tubes 6 by ¾ in. (15 by 1.5 cm.) and a test-tube rack to hold 12 tubes; Bunsen burner or spirit lamp; simple water-bath or saucepan; tripod and wire gauze; several small glass funnels 3 in. (7.5 cm.) diameter; filter paper No. 1 Whatman 12.5 cm. diameter; litmus paper; two 25-ml. graduated glass cylinders; two beakers of 50-ml. capacity.

Reagents.—Strong hydrochloric acid; strong nitric acid; strong ammonia (0.880); acetic acid (33%); strong solution of iodine (liq. iod. fort., *B.P.*); saturated solution of ammonium oxalate; 25% solution of salicylsulphonic acid; 10% solution of barium chloride; hydrogen peroxide (20 vol.); 10% solution of ferric chloride; 3% solution of silver nitrate; absolute alcohol or industrial methylated spirit; Benedict's qualitative reagent; Fouchet's reagent (this is made by dissolving 25 g. of trichloracetic acid in 100 ml. of water and adding 10 ml. of 10% ferric chloride solution); 5% alcoholic pyramidone; chloroform; zinc acetate in powder; sodium nitroprusside crystals; ammonium sulphate crystals.

Nature of the Specimen

It is important, particularly when testing for reducing substances, to know the time of the passing of the specimen in relation to the previous meal. The specific gravity of a urine will be influenced by marked variation in the fluid intake prior to the passing of the specimen. Traces of protein and increased cell content have a quite different significance in a fresh specimen passed in the surgery by a male patient from that of a specimen passed by a female patient, because the latter may have been contaminated by vaginal secretion. For most chemical examinations a fresh specimen is all that is necessary, but in the case of suspected haematuria, proteinuria, or infection it may be necessary to get a catheter specimen from a female patient.

Appearance and Colour.—Normal urine is of a straw colour which may be pale or dark merely because of variation in concentration. It is quite clear apart from an occasional cloud of mucus. Any turbidity is due to bacteria or suspended deposit which may be crystalline, amorphous, or cellular.

Reaction.—Normal urine is usually acid to litmus paper, but soon after a meal the alkaline tide may result in the production of an alkaline specimen which on standing will deposit a heavy cloud of earthy phosphates.

Specific Gravity.—In an average specimen this ranges from 1015 to 1020 and is influenced by the amount of fluid taken and by the loss of fluid by other channels than the urinary tract. The urine of a patient with chronic nephritis shows a more or less fixed low specific gravity, and limitation of fluid does not raise it appreciably. A specific gravity in the region of 1030 or over is usually due to the presence of sugar.

Deposit.—To the naked eye normal urine shows no appreciable deposit. Concentrated urines may show a deposit of urates, usually coloured pink, or a "Cayenne pepper" deposit of uric acid. The urates will dissolve immediately on warming the urine to about 60° C. Excess oxalates in a specimen of urine are usually recognized by microscopy; they appear in both acid and alkaline urine. Alkaline urines will usually have a phosphatic deposit readily soluble in a little acetic acid. Urates may also be deposited in a concentrated alkaline specimen.

Microscopical Examination of the Deposit

About 10 ml. of urine (which should be as fresh as possible) is centrifuged for 10 minutes at about 2,000 rev. per minute, and after removal of the supernatant fluid by decantation a drop of the fluid from the bottom of the tube, taken by a dropping pipette and teat, is transferred to a glass slide and covered with a coverslip. If a centrifuge is not available the urine should be allowed to stand for two to three hours in a tapered urine glass and a little of the deposit removed by a pipette and teat. Description of the cellular elements, casts, and crystals is usually of little help and it is best to learn to recognize them by practice on known specimens and comparison with the diagrams in textbooks of pathology. Apart from a marked excess of oxalates or uric acid the only crystals of importance are those of cystine; they are colourless, regular hexagonal plates, readily soluble in ammonia and hydrochloric acid but insoluble in acetic acid. Calcium oxalate crystals are envelope-shaped and are insoluble in acetic acid but soluble in hydrochloric acid. Uric acid crystals have always a red or brown colour and are insoluble in hydrochloric acid but soluble in solution of lithium or sodium carbonate. The commonest artifacts resembling cystine are maize-starch grains from dusting powders; these are readily recognized by their blue or black colour on the addition of solution of iodine.

Protein

Normal urine contains no proteins except a trace of mucin. Pathological proteinuria may be due to the presence of albumin, globulin, haemoglobin, methaemoglobin, or Bence Jones protein. As the tests depend on the appearance of a turbidity or precipitate, it is essential that the specimen should be filtered if it is not already clear. If the urine cannot be rendered completely clear, then some of the filtered specimen should always be used as a control to compare with the turbidity of the tested fraction.

Boiling Test.—For this test the urine should be acid to litmus; if not, it should be made so by the addition of just sufficient acetic acid. Boiling an alkaline urine containing protein may convert the latter into alkaline metaprotein; this does not coagulate and on the subsequent addition of acetic acid it becomes acid metaprotein, also in solution, and a false-negative result is obtained. Take about 10 ml. of urine in a test-tube and, holding the bottom with the first finger and thumb, boil the upper third. A cloud or precipitate may be due to protein or the appearance of earthy phosphates owing to the loss of carbon dioxide rendering the urine alkaline. Add two or three drops of 33% acetic acid. Phosphates will disappear, but the protein turbidity will remain and may become more intense. If on heating a cloud appears well below the boiling point and disappears partially or wholly on further heating and then reappears on cooling, Bence Jones protein is present. The boiling test is sensitive and reliable if the urine is clear and acid before the test is made.

Salicylsulphonic Acid Test.—To about 5 ml. of urine in a test-tube add 10 drops of 25% salicylsulphonic acid. The presence of protein is shown by a turbidity or precipitate. This is a useful test, as the original reaction of the urine does not matter. It has the disadvantage that it will not discriminate between Bence Jones protein and other proteins, and it is possible to get a false-positive reaction with urines containing iodoxyl after pyelography.

Blood

A chemical test for blood will indicate haemoglobin and its iron-containing derivatives such as methaemoglobin. To about 5 ml. of urine add three or four drops of 33% acetic acid and about one-fifth of its volume of solution of pyramidone in alcohol, pouring the latter down the slanted test-tube so that it forms a layer above the urine. Add four or five drops of hydrogen peroxide (20 vol.) so that it causes a disturbance at the junction of the liquids. A positive result is shown by the immediate development of a mauve colour at the junction of the liquids spreading up into the alcoholic layer. The colour soon fades unless the amount of blood present is excessive. If the colour appears very slowly and increases steadily for from five to ten minutes, it is probably a false reaction due to the presence of iodides. This can be confirmed by adding about 1 ml. of strong nitric acid to about 5 ml. of urine and then adding about 1 ml. of chloroform. Any liberated iodine will dissolve in the chloroform, giving it a mauve colour. The pyramidone test is quite sensitive but will not, of course, detect a few red blood cells such as can be seen in a microscopical examination of the deposit. It is a test for haemoglobin and will not distinguish haemoglobinuria from haematuria. Urines containing methaemoglobin will have a port wine or dark brown colour; its presence needs confirming by finding the characteristic absorption bands with a hand spectroscope. The use of this instrument for detection of pigments in urine is well described in Harrison's *Chemical Methods in Clinical Medicine.*

Reducing Substances

In the surgery the important points are, first, is a reducing substance present? and, secondly, is it glucose? If the latter, then further tests may be necessary to establish the diagnosis of diabetes. Take 5 ml. of Benedict's reagent, measured if possible in the graduated cylinder. Place it in a test-tube and add 0.5 ml. or eight drops of urine by dropping pipette (held vertically). Mix by shaking and boil thoroughly for at least one minute, or place in a boiling-water-bath for five minutes, and allow it to stand for a few minutes. A positive result is shown by the presence of a yellow or reddish yellow precipitate. A green colour or a greenish precipitate should be ignored, as it is probably due to a concentration of normal urinary constituents. It is of the greatest importance that the quantity of urine to that of Benedict solution should not exceed 1 to 10 or many false positives will result.

As glycosuria, whatever its cause, depends upon the blood level, when the urine is collecting in the bladder it is important to know that enough carbohydrate has been taken to cause such a blood level. The actual concentration in the urine will also be influenced by the amount of fluid taken. The best time to test for glycosuria is in the first specimen passed one and a half to two hours after a fairly liberal carbohydrate meal. If a negative result is obtained it is unlikely that the patient ever passes glucose. Other reducing substances are not dependent upon the previous carbohydrate intake, and reduction may be obtained in the presence of lactose, pentoses, laevulose, and derivatives of salicylates taken in the form of aspirin, sodium salicylate, or *para*-aminosalicylic acid. Pentoses are of no pathological significance, but their presence inevitably gives rise to a suspicion of diabetes. They may appear after their ingestion in fruits, but occasionally persistent pentosuria, unaffected by diet, occurs as an inborn error of metabolism.

A very rare cause of reduction is due to homogentisic acid in alcaptonuria. The reduction due to pentoses is not very pronounced and will be much the same in any specimens, fasting or otherwise. Glycuronates are very rarely a real cause of difficulty and will be related to the ingestion of large amounts of some drug such as morphine, chloral, etc. In adults, lactose, except in very small amounts, is found only in the urine of nursing mothers and is specially apt to occur at the time of stopping breast-feeding. Lactose may occur in the urines of infants with gastro-intestinal disturbance; very rarely galactose is found in the urines of infants made ill by the taking of milk in any form. Laevulose is uncommon but will sometimes be found in the urine of those consuming large amounts of honey.

The commonest false positive is that due to salicylates. Its incidence bears no relation to meals. If suspected it can be recognized by adding about 10 drops of solution of ferric chloride to about 5 ml. of urine and noting the intense purple colour.

Confirmation of the presence of glucose can be made by osazone and fermentation tests, and minute traces may be detected by chromatography; but the relation of the reducing substance to meals is usually sufficient evidence on which to base the diagnosis of glycosuria.

Acetone Bodies

The acetone bodies present in urine may be acetone, diacetic acid (aceto-acetic acid), and β-hydroxy butyric acid. Qualitative tests are available only for the acetone and diacetic acid. Ketonuria is usually associated with diabetes, but it can occur in any condition in which there is deprivation of or failure to use carbohydrate. Children rapidly develop acetone bodies in the urine when carbohydrate is cut off by vomiting or fasting.

Rothera's Test.—In a test-tube place ammonium sulphate to about the 1-in. (2.5-cm.) level and add about 10 ml. of urine. Shake well until most of the ammonium sulphate has dissolved. To this add three or four drops of a fresh solution of sodium nitroprusside, made by dissolving a few crystals in about 1 in. of water in a test-tube so that a fairly deep red solution results. Then add one drop of strong ammonia and mix well. A positive result is shown by the appearance of a deep purple colour. The test is given by both acetone and diacetic acid and is extremely sensitive. Because of this sensitiveness slight colour production should be ignored, and negative results indicate that there is no degree of ketosis. If the positive reaction is marked it is as well to perform a further test with ferric chloride, which, being relatively insensitive, has a greater significance if positive.

Ferric Chloride Test.—To about 10 ml. of urine add solution of ferric chloride drop by drop, mixing well after each addition, until the precipitated ferric phosphate appears to be maximum. Filter, and if the filtrate is free from any marked reddish colour add another drop of ferric chloride. If the phosphates have not been fully precipitated a further precipitate will result and the fluid must again be run

through the filter paper. To the clear filtrate add the ferric chloride solution drop by drop and notice if a red or reddish brown colour develops. It is very important to add the ferric chloride with care as excess destroys the colour of the iron salt formed with diacetic acid: false negatives are always due to excess of reagent. Of the acetone bodies only diacetic acid gives a colour. As the test is not very sensitive a genuine positive result indicates a fairly marked degree of ketosis. Drugs such as salicylate can give an intense purple or reddish purple colour but a negative nitroprusside test. If there is any doubt about the genuine nature of a ferric chloride test, take 10 ml. of urine in a cylinder and add 10 ml. of water, transfer to a small beaker, and boil until the volume is reduced to about 10 ml. Repeat the ferric chloride test. Any diacetic acid will have been converted to acetone and driven off by the boiling and no colour will now be obtained. Drugs will not be volatile and the result will be practically the same as in unboiled urine.

Bile Pigments

Bile pigments are present in urine only in jaundice, so a patient who shows no sign of pigmentation of the sclerotics is unlikely to have bile pigment (bilirubin) in his urine. Bile pigment may cause the urine to vary in colour from orange to deep brown; occasionally on standing there is a greenish tint due to oxidation to biliverdin. A characteristic of urine containing an appreciable amount of bile pigment is that, on shaking, the froth acquires a yellow tinge. Dark urines due to concentration, urobilin, blood pigment derivatives, and drugs do not show this. The yellow colour of the froth is not easily recognized in artificial light.

Iodine Test.—To about 10 ml. of urine add about one tenth of its volume of dilute iodine solution—that is, 1 part of liq. iod. fort. diluted with 20 parts of water. Pour the iodine slowly down the side of the slanted tube so that it forms a layer on the surface of the urine. A green ring developing at the junction of the two liquids is proof of the presence of bile pigment. This is a good but not very sensitive test.

Fouchet's Test.—For the detection of small quantities of bile pigment this test is the most reliable. To about 10 ml. of urine add about 2 ml. of 10% barium chloride solution. Mix well and filter. The precipitated barium sulphate and phosphate will absorb the bile pigments and after the filter paper has been allowed to drain it should be opened out flat on a white tile or another filter paper. Two drops of Fouchet's reagent are dropped in the centre. The presence of bile pigment is shown by the production of a green or greenish blue colour due to the oxidation of the bilirubin.

Bile Salts

The Sulphur Test.—Place about 50 ml. of clear urine in a beaker or urine glass and from a sprinkler or pepperpot sprinkle dry flowers of sulphur on to the surface. A positive result is shown by the sulphur particles streaming towards the bottom of the vessel. The beaker is best viewed by transmitted light; shaking must be avoided. This test cannot be done properly in a narrow vessel such as a test-tube. It is a sensitive test but can be given by other substances capable of lowering surface tension. Urine from a case of jaundice of some duration with much bile pigment will not necessarily show any bile salts as these are excreted only in the early days of the onset of obstructive jaundice and sometimes when a case of infective hepatitis is clearing up.

Urobilin

The presence of urobilin in the urine indicates either excessive haemolysis with excess production of the pigment or of some degree of liver damage. It is excreted partly as the colourless chromogen urobilinogen and partly as the yellow or orange pigment. On standing, urobilinogen is slowly converted to urobilin and the colour of the urine will deepen. Marked urobilinuria closely resembles the colour of bile pigment, but the froth is not coloured on shaking and gives no reaction with iodine or Fouchet's reagent. There is no point in trying to distinguish between urobilin and urobilinogen, and the best test is Schlesinger's, which gives a reaction with either.

Schlesinger's Test.—To about 10 ml. of urine in a test-tube add two drops of liq. iod. fort. or any comparable solution of iodine; mix well. In another tube place about 1 g. of powdered zinc acetate and add about 10 ml. of absolute alcohol or industrial methylated spirit. Shake well and mix the two fluids, pouring from one tube to another several times, and then filter. A positive result is shown by a filtrate that while yellow or pinkish yellow to transmitted light will show a definite green fluorescence by reflected light. The test is best carried out in daylight. This test is sensitive, and unless the fluorescence is readily perceptible an excess of urobilin can be excluded.

Chlorides

It is sometimes important to know if a patient is excreting a reasonable amount of chloride, and this can best be ascertained by adding to about 10 ml. of urine about 1 ml. of strong nitric acid and 2 ml. of solution of silver nitrate. Normal urine should give a heavy white curdy precipitate. No precipitate or only a slight turbidity or opalescence indicates a marked chloride deficiency in that specimen.

Next article on Clinical Pathology.—"Infected Urine," by Dr. Cuthbert E. Dukes.

Refresher Course Book.—The first collection of articles in the Refresher Course for General Practitioners (fully revised) are available as a book containing 55 chapters, price 25s. Copies can be obtained either direct from the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1, or from booksellers.

BUTAZOLIDIN SYMPOSIUM

CLINICAL AND EXPERIMENTAL OBSERVATIONS

A symposium on "butazolidin" (phenylbutazone) was held under the auspices of the Empire Rheumatism Council at the Royal Society of Medicine on November 13. The clinical section was under the chairmanship of Dr. W. S. C. Copeman, and Professor E. C. Dodds presided over the experimental section.

Dr. O. STEINBROCKER (New York) presented the results he and his colleagues had obtained with both short- and long-term butazolidin treatment. They found that it was a powerful analgesic, but that its antirheumatic effect, if any, was slight. They had compared the effects of intra-articular injections of butazolidin and hydrocortisone, and, although they had not observed any significant differences in the results, he was not prepared to attribute an antirheumatic action to phenylbutazone on this basis. The incidence of side-effects was 22% in the short-term therapy, and it was found that toxicity occurred in one-third of the cases on long-term treatment. At all periods administration of the drug was fraught with hazards. Dr. Steinbrocker emphasized that no serious toxic effects were encountered in the first 500 cases treated by his group, but that following this two major episodes occurred within one week. He warned against undue optimism and advised weekly analysis of urine and blood counts during the whole course of treatment.

Analgesic Action

Dr. J. P. CURRIE (Glasgow) compared the analgesic action of butazolidin with that of other analgesic antipyretics and newer analgesics. In conditions other than "rheumatism"

butazolidin was a poor analgesic, and he thought that there was some specificity for "rheumatic" pain. In a series of some 1,200 cases not only was the incidence of toxicity extremely low, but even mild side-effects were rarely seen.

It was known that toxicity was increased by the simultaneous administration of amidopyrine and barbiturates, and in Glasgow they were very careful to stop all other drugs during the administration of butazolidin. He suggested that the high incidence of toxic effects encountered by other observers might be due to the fact that phenobarbitone was so extensively used. The potency of pyrazol derivatives in relieving the symptoms of rheumatoid arthritis appeared to be proportionate to their experimental trauma-protective effect, and it was suggested that further screening of pyrazol compounds should make use of this association.

Dr. G. R. NEWNS (Sheffield) discussed the results obtained in 197 cases treated with phenylbutazone. There was sustained relief of pain in 65% of patients, but the drug did not affect the course of the rheumatoid process. Toxic effects occurred in 25% of cases, and included gastro-intestinal disorders, skin rashes, agranulocytosis (with one death), and oedema. In spite of the high incidence of toxicity he considered the use of butazolidin in rheumatoid disease was justifiable and that it was particularly useful in the rehabilitation of the more long-standing cases.

Blood Concentrations and Toxicity

Drs. ENA BRUCK, M. E. FEARNLEY, and R. I. MEANOCK (London) reported that the incidence of toxic effects increased considerably with increasing blood concentrations of phenylbutazone. When the blood concentration rose above 10 mg./100 ml., 85% of patients developed toxic effects, as against 37% with blood concentrations between 5 and 9 mg. and 12% between 0 and 4 mg. Maximum relief of symptoms occurred with blood concentrations between 5 and 10 mg./100 ml. Increasing the blood concentration to above 10 mg. did not produce further relief of symptoms. In view of the marked variations in absorption of the drug in different individuals they considered it was impossible to formulate a rigid dosage schedule which would prove satisfactory in the majority of patients.

The discussion was opened by Dr. F. DUDLEY-HART (London), who agreed that butazolidin was a powerful analgesic without specific antirheumatic effects. Its value, he thought, was greater in osteoarthritis than in rheumatoid arthritis and he had found it effective in Paget's disease and metastatic carcinomatosis.

Dr. JOHN GLYN said that they had treated 11 cases of rheumatic fever at the Bellevue Hospital, New York, and found that the results were comparable with those produced by salicylates. The constant and dramatic response of the joint inflammation as well as the immediate effect on pyrexia and tachycardia provided some evidence that in this condition butazolidin had more than a purely analgesic effect.

Professor R. DOMENJOS (Saarbrucken) said that he and his colleagues had found that the effect of butazolidin in inhibiting formalin-induced inflammatory oedema in rats was significantly greater than that of A.C.T.H. or cortisone. They were unable to demonstrate any correlation between the adrenal ascorbic-acid-depleting effect of various drugs, including phenylbutazone, and their anti-inflammatory effect. He considered this lack of correlation indicated that butazolidin did not act via the pituitary–adrenal axis. Experiments in rats showed that the effects of phenylbutazone were not influenced by adrenalectomy and that renal excretion of various substances, including P.A.S. and penicillin, was appreciably delayed by butazolidin.

Dr. R. M. MASON (London) presented observations he had made on uric acid metabolism in four patients with gout and one patient with Paget's disease who was treated as a control. These patients took 600 mg. of butazolidin daily by mouth, and in all but one, who developed congestive heart failure, there was a persistent though slight increase in uric acid excretion and a corresponding fall in blood levels. He believed that the explanation for the differing results reported by other observers lay in the variable preponderance of water-retaining and uricosuric effects in individual patients.

Effect on Clotting Time

Dr. J. G. HUMBLE (Westminster Hospital) reported that in 44 patients treated with butazolidin the clotting time was significantly increased in six cases and in 14 cases the prothrombin times were prolonged. Experiments showed that butazolidin plasma would correct the deficit in "tromexan" plasma and in "aged" normal plasma. It would not correct that in patients suffering from liver disease and obstructive jaundice. He considered, therefore, that the cause of the clotting effect was due to deficiency of prothrombin. This was confirmed by the two-stage prothrombin assay. The oral administration of vitamin K_1 resulted in a prompt return to normal of both prothrombin and clotting times.

Drs. A. HILL and M. S. GOOD (Aylesbury) had studied the effect of butazolidin on C-reactive protein, but the number of cases was too small to enable them to reach any definite conclusions. Their preliminary observations, however, led them to believe that further studies in this field would be amply justified.

Dr. P. O. WILLIAMS (London) reported that butazolidin caused retention of sodium and water during the first few days of treatment, but with continued administration of the drug both water and salt excretion returned to normal. In 13 patients who developed oedema while on treatment with butazolidin all except one had some demonstrable cardiac or renal lesion. He suggested, therefore, that oedema did not develop during therapy unless there was some other pre-existing defect in the control of salt-and-water balance. Since oedema occurred only under these circumstances he did not favour the routine prescription of the low sodium diet. When oedema does develop it should be regarded as more than a simple side-effect of the drug.

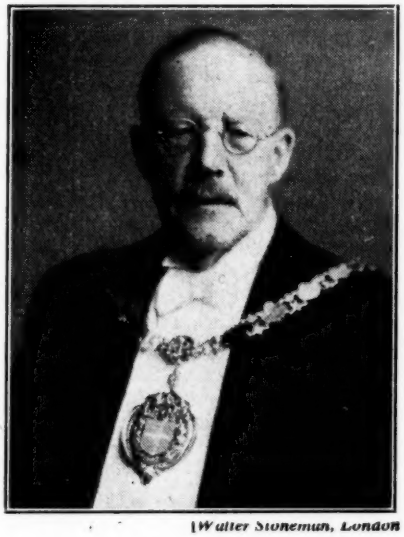
SIR RICKARD CHRISTOPHERS, 80

One of the leading malariologists of the century, Sir Rickard Christophers, celebrated his eightieth birthday this week (on November 27). Colleagues who have worked with him in recent years may find it hard to believe that he is anything like that age, though anyone familiar with the extent of his work—work still in progress, needless to say—will wonder how one man can have found time to accomplish so much. He graduated in medicine in 1896, and his first contact with the disease with which his name will always be associated was in 1898, when with J. W. W. Stephens and C. W. Daniels he was appointed a member of the Malaria Commission of the Royal Society. The investigations conducted in 1899–1900 by the Commission in Central and West Africa laid the foundation of the study of malarial epidemiology. For the first time the conceptions of endemicity in malaria as now understood were set out, and for the first time the principle of segregation of the susceptible immigrant from indigenous infection was laid down as a major antimalarial measure. The connexion between blackwater fever and malignant tertian malaria was also established.

A year or two later Christophers and Stephens carried out researches in India which had a profound effect on the future of malariology in that country, for they stimulated general interest in the study of malaria problems. One important discovery was that different species of anopheles are very selective in their choice of breeding-place and vary widely in their capacity for transmitting malaria—the foundation of the modern concept of species sanitation. Christophers entered the Indian Medical Service in 1902, and during the next few years he was busy studying the life cycle of

various blood parasites—notably *Hepatozoon canis, H. gerbilli,* and *Babesia canis* in both their mammalian and insect hosts—the anatomy and histology of the tick, and the newly discovered parasite of kala-azar. In 1909 he founded the Central Malaria Bureau at Kasauli and started the collections which formed the basis for systematic study of the mosquito fauna of India. He returned to this work after military duty during the first world war in Mesopotamia, where, as might be expected, he made important observations on the anopheline fauna of that country.

In 1924 he published his classic paper on the mechanism of immunity against malaria in communities living under hyperendemic conditions. In the same year he described a new technique for the accurate measurement of the spleen, which has been used as a standard method in India for malaria surveys ever since. Before retiring from the I.M.S. in 1932 Christophers was director of the Kala-azar Commission in Assam in 1924–5 and of the Central Research Institute in Kasauli from 1925 to 1932. His volume on Anophelini in the "Fauna of British India" series appeared in 1933.



[Walter Stoneman, London

From 1932 to 1938 Christophers was professor of malarial studies at London University with his headquarters at the London School of Hygiene and Tropical Medicine. Strains of monkey malaria had recently become available for study, and he was quick to realize the importance of this new field of research. In collaboration with J. D. Fulton he conducted a series of comparative studies of the respiratory metabolism of *Plasmodium knowlesi* and *Trypanosoma rhodesiense,* the first observations of their kind in this field. After six years he left London and settled in Cambridge, where he now lives and works. During the second world war he was in charge of the mosquito repellent inquiry. During his investigation of the repellent properties of several hundred substances he devised new methods for breeding large numbers of mosquitoes in the laboratory and techniques for the testing of repellency. When hostilities ceased he found himself at last free to return to his first love, the mosquito. He is at present engaged on a study of the natural history and structure of *Aedes aegypti,* and this, we understand, is nearing completion. Recently he delivered the Manson Lecture on "Malaria in the Field" before a large and enthusiastic audience at the London School of Hygiene.

A list of all the honours Sir Rickard has received would be a lengthy one. He was appointed C.I.E. in 1915, made Honorary Physician to the King from 1927 to 1930, and knighted in 1931. He has received numerous medals, among them being the Queen Wilhelmina Jubilee Foundation Medal in 1928 and, this year, the Buchanan Medal of the Royal Society, to which he was elected in 1926. His presidency of the Royal Society of Tropical Medicine and Hygiene ran from 1939 to 1943.

His work continues, and he still maintains an interest in a side-line study, that of geology. His many friends, not least those in India, will join in extending their heartiest good wishes to him and to Lady Christophers on this occasion.

Correspondence

Because of the present high cost of producing the Journal, and the great pressure on our space, correspondents are asked to keep their letters short.

Seven Insulins in Britain

SIR,—Since Monday, November 16, seven insulin preparations are available on the British market, three old and four completely new, to the medical profession and the diabetics of this country. The whole question of these new insulins was discussed by interested doctors at the annual meeting of the Diabetic Association last July, and it was felt most strongly that the introduction of all these little-known new preparations at once would be most confusing to doctors and hence even dangerous to patients. It was unanimously agreed to advise the authorities that one only, the least unknown and most generally promising, should be introduced first. This opinion was immediately forwarded both to the Ministry of Health and to the British Insulin Manufacturers. Events have shown that this expert medical opinion has been completely ignored. And, after all, several diabetic centres have worked intensively at testing these new products for the British Insulin Manufacturers, and the neglect of our known opinion has been our reward.

I feel that the above should be made public in your columns in the hope of preventing a similar occurrence again, because I think there will be further modifications of insulin within the next few years. I should like to know what other steps, apart from raising the matter in Parliament, we might take to ensure that the considered opinion of those deeply concerned with the best treatment of diabetics in this country should not again be ignored.—I am, etc.,

London, W.1. R. D. LAWRENCE.

Insulin Zinc Suspensions

SIR,—We feel that the series of papers on the new insulins (*Journal,* November 7) require comment. We have been using "lente" insulin for the treatment of diabetic outpatients, selecting only patients requiring high doses of insulin or those in whom satisfactory control had not been achieved with other insulins. So far lente insulin has been tried in 15 cases, all of whom have been at work. In general, we agree with the authors of the several papers that in such patients lente insulin will frequently achieve satisfactory control with a single daily dose. In some respects, however, our impressions differ from those conveyed by some of the papers and by your leading article.

Drs. J. D. N. Nabarro and J. M. Stowers (p. 1027) suggest that the present mixture of lente insulin is not suitable for the British dietary habit, and your leading article (p. 1037) supports their suggestion that the proportions of crystalline suspension and amorphous insulin should be altered. This would add yet another mixture to the many available, which seems quite unnecessary. The bulk and carbohydrate content of a meal can be varied independently by any dietitian, and in this way the dietary habits of the patient can be adjusted to the type of insulin. In our experience there is no characteristic dietary habit, for, while many patients are accustomed to take their main carbohydrate meal at midday in the form of sandwiches, others habitually have it at night. It seems to us unjustifiable on the experience of some 30 cases to suggest that a mixture of insulin which has been found suitable for some 500 patients in Denmark is unsuitable in this country. Like Drs. I. Murray and R. B. Wilson (p. 1023), we have found patients who have not been as well controlled on lente insulin as on globin or a mixture of soluble and zinc protamine. We do not agree, therefore, with the suggestion of Dr. Wilfrid Oakley

(p. 1021) that globin and P.Z.I. insulin should be withdrawn. No paper reports local reactions to the new insulins. Two of our patients who are sensitive to globin and P.Z.I. have also developed local reactions to lente insulin.

Drs. Nabarro and Stowers suggest that insulin should be injected one hour before breakfast. We have not found this necessary. Many of our diabetics leave for their work at 6 a.m. after taking their insulin and a light breakfast at 5.30 a.m. They have a second breakfast when they get to work. They would be reluctant (and unlikely) to get up before 5 a.m. in order to inject their insulin.

There is no doubt that the new insulins, particularly lente, are a valuable addition to the range available for treating diabetes. We do not think that any one preparation can cover the whole range of the diabetic population; the other insulin preparations which are available have still a place in out-patient treatment.—We are, etc.,

A. STUART MASON.
D. VEREL.

London, E.1.

SIR,—We should be grateful if you would allow us to comment on some of the points raised in the three articles on the insulin zinc suspensions ("lente" insulins) published in the *Journal* of November 7, and in your leading article on this topic in the same issue (p. 1037).

In his authoritative paper Dr. Wilfrid Oakley (p. 1021) suggests that, while the time is ripe for the introduction of "lente" insulin, the marketing of "semilente" and "ultralente" should be deferred. However, as Drs. Ian Murray and Robert B. Wilson make clear in their article (p. 1023), some diabetic patients cannot obtain with lente alone a control superior to that achieved with the previously available insulin preparations: they need a mixture of lente with semi- or ultralente. It would seem a pity to deny to these patients, few though they are, the advantages of the lente series when many of their fellow patients will certainly be gaining these advantages—from the lente preparation used by itself. Very careful trials have been and are being carried out with both semilente and ultralente in Denmark and in this country, and the results are certainly favourable.

Drs. Nabarro and Stowers suggest that an 80 u. per ml. ultralente preparation is desirable. It was not anticipated by Novo, or indeed by the other manufacturers, that there would be any great demand for the preparation in this strength; but, if there should prove to be such a demand, steps will be taken to meet it. As regards their desideratum of a lente preparation that can be mixed with soluble insulin to give a mixture of predictable effect, the Novo Laboratories have this under very active consideration. We would, however, point out that semilente can be so mixed, that in its action it resembles soluble insulin fairly closely, and that in future the only major sphere of usefulness of soluble insulin may well prove to be that of diabetic emergencies. In other words, for everyday use the lente series will be sufficient.

As regards their final suggestion that for the lente preparation a semilente-ultralente ratio of 2:8 (or 1:4) would be more suitable to the British dietary than the present lente ratio of 3:7, it can be stated that Novo also have this matter under consideration. While prepared to make any necessary adjustment in lente for this country, Novo are unwilling to do this unless the need for it is generally accepted. Other things being equal, it would obviously be undesirable to have a lente preparation that differed in its composition from country to country; though doubtless, in view of the multiple dietary variations that do exist, a case could be made for such variation.

Finally, in connexion with the implication in your leading article that supplies of the lente insulins are inadequate, we would point out that unless the size of the demand is known it is impossible to say whether or not supplies will be sufficient. While demand may outrun the supply, there are no grounds at present for advising doctors not to prescribe the lente insulins for those patients who will clearly be suited by them.—We are, etc.,

R. POWELL.
S. BRADSHAW.

Medical Information Department,
Evans Medical Supplies Ltd.,
Liverpool.

Appendix in Hernial Sac

SIR,—Recent correspondence in the *Journal* on the incidence of inflamed appendices in hernial sacs has revealed six cases—two inguinal (Dr. T. E. Winckworth, September 5, p. 567; Mr. H. B. Walker, October 17, p. 886) and four femoral (Dr. T. D. S. Holliday and Mr. J. R. A. White, two cases, October 3, p. 779; Dr. D. G. Maurice, two cases, October 17, p. 887). In all except one the appendix was removed through the incision used for the exploration of the hernia. The surmise of the true incidence depends on recording details of such cases when the question is raised, and hence the following notes of a true strangulation of the appendix which I recently encountered are offered.

A moderately thin woman of 36 was suddenly seized with pain in the right groin followed by vomiting. Over the next few hours a small lump in this region, noticed by the doctor, gradually became tender, and the patient was referred to hospital. A small, fixed, tender, cherry-sized lump was found over the right femoral region. There was no discoloration and no source of infection in the leg. Exploration revealed a U-loop of a fairly long appendix tightly strangulated in the femoral canal, the tip and base being normal. The appendix was removed, none too easily, as the portion of caecum to which the base was attached could just be drawn into the canal and no more. Repair was then carried out, and this was followed by rapid recovery.

As regards the question of normal appendices in hernial sacs also raised, I recently removed an appendix the tip of which protruded through an inguinal sac on the left side in a small child—an unexpected manœuvre.—I am, etc.,

HENRY B. YOUNG.

Wolverhampton.

SIR,—I have noted the various letters on this subject and I am particularly interested in Mr. H. B. Walker's case in a 7-weeks-old infant (*Journal*, October 17, p. 886).

Some years ago I had a similar case in the Royal Hospital for Sick Children, Glasgow. The patient, a boy, was born two months prematurely and on admission he was 3 weeks old and weighed 3 lb. 12 oz. (1.7 kg.), so that he was operated on five weeks before he should have been born. A large right scrotal hernia had been present since birth but gave no trouble until the day before admission, when it increased in size and became irreducible, with continuous vomiting and constipation.

Under a general anaesthetic, the large mass of hernia was reduced by taxis except for a sausage-shaped swelling which still extended along the inguinal canal into the scrotum. It could be rolled under the fingers, and it was diagnosed as probably the appendix. In spite of the protests of the theatre sister I decided to operate. The large sac was dissected out and opened. It contained the appendix, which was gangrenous in the distal two-thirds, owing to strangulation in the neck of the sac. The appendix was removed and the hernia repaired. Recovery was uneventful.

It is well to remember that, while strangulation in inguinal hernia in infants is uncommon, it certainly does occur. The danger of a reduction *en masse* in such a case is well known, and it would appear from this case that the possibility of leaving a strangulated gangrenous appendix after apparent complete reduction by taxis must be borne in mind.—I am, etc.,

WILLIAM BEATTIE.

Glasgow.

Overseas Service

SIR,—Mr. Ian Fraser (*Journal*, October 31, p. 987) is right. It is lamentable that in a great imperial and maritime country thousands should be moaning for comfortable jobs in the N.H.S. at home when there is so much work to be done in places like the Gold Coast. Tough work, certainly, but so remarkably varied and highly coloured. He is right, too, in asserting that a doctor should be paid more than most other classes of expatriate, the mental and physical strain of a medical officer's work being so much heavier. Compare it, for example, with that of a person sitting in an office in secretariat or treasury.

A serious deterrent to service overseas now is the greater difficulty in re-settling, compared with pre-1948 times, after normal retirement, or earlier retirement for health, family, or other reasons. Here the Ministry of Health could help by a directive that whenever a post in the N.H.S. is being filled, whether hospital (other than teaching) or general practice, any applicant who has served six or more years in the armed Forces, Colonial Service, or mission field, and is otherwise adequately qualified, should have preference over all applicants who have not so served.

It is unfortunate that there is in medical circles in this country a certain bias against those of us who work overseas. If at a refined medical gathering one mentions that one is in the Colonial Service (as I used to be), or a ship surgeon (as I am now), there is a distinct drop in the temperature. A directive such as that outlined above would be simple and just, and its benefits would be felt in many quarters.—I am, etc.,

Bristol, 8. G. L. ALEXANDER.

SIR,—I refer to the article by my friend Mr. Ian Fraser on the need for medical officers in the Gold Coast (*Journal*, October 31, p. 987) and your annotation (p. 984). A poet has written that "the thoughts of youth are long, long thoughts." The thoughts of young medical men and women are long enough to stretch ahead to the end of a normal period of service in the Tropics, and to cause them to ask about their prospects of employment on returning home, for I do not think that Mr. Fraser would suggest that service in the Tropics should be for the term of one's natural life.

If, like myself, the returning physician, surgeon, sanitarian, pathologist, ophthalmologist, etc., is a native of Northern Ireland, he will find, for example, that the public health service there is completely closed to him by the regulation which debars anyone from holding a public health appointment unless he has been continuously resident in the United Kingdom for five years immediately preceding. If he seeks a hospital appointment he comes up against the age limit, and if he seeks to enter general practice he finds that the panel has been virtually closed for some years. I am not well informed about the position in the rest of the United Kingdom, but within the circle of my own acquaintance I could name two surgical specialists, an ophthalmic specialist, a pathologist, and the chief health officer of a State, none of whom are employed in their specialties. The principal medical officer of a colony obtained a public health appointment of the grade open to persons qualified for two years.

If, as Mr. Fraser says, the specialist service in the Gold Coast is the first priority, I can think of no more potent attraction to bring good men and women into the service, and keep them there for the full term of service, than the assurance that the emeritus medical officer who is highly qualified academically and by experience and by achievement will be employed in a post worthy of his capacity on his return.—I am, etc.,

Belfast. H. G. CALWELL.

Medical Needs in the Gold Coast

SIR,—As one who has been in the Gold Coast Medical Service, I read your annotation (*Journal*, October 31, p. 984) with considerable concern. You write of a country subject to rapid economic and political change. Rapid political change may well be, but the evidence of rapid economic change is difficult to see. We must remember that the Gold Coast is, in the sterling area, second only to Malaya in earning dollars, and her economic future is reasonably assured. The prospect of uncertainty of employment of non-Africans during the next forty years is so remote as to be out of sight. As Mr. Ian Fraser writes (*Journal*, October 31, p. 987), "Certainly this [Africanization] will happen in time, but at the moment the question does not arise."

It is indeed an exaggeration to imply that qualified Africans are reluctant to return home. Only one Government scholar has remained in the United Kingdom, and all privately qualified Africans have returned to the Gold Coast except one. This has occurred over the last twenty years, during which some twenty scholars have been sent to the United Kingdom. The Government scholar who stayed behind is now fully ready for appointment "to fill one of the many specialist posts available" mentioned by Mr. Fraser. It remains to be seen whether he will get appointed.

It can be stated with every confidence that all who wish to go and help can do so with assured prospects of work in an exhilarating field where, in the absence of the accustomed diagnostic aids, there is required greater clinical acumen.—I am, etc.,

Eccles. K. A. TAYLOR.

Symptoms of Temporal Arteritis

SIR,—Like Dr. K. V. Crowther (*Journal*, October 17, p. 888), I have been interested in the association of joint pains with arteritic symptoms in temporal arteritis. I met this association in the first case which I saw 17 years ago, and from my subsequent personal experience of the disease and from that of others it is evident that the association is not fortuitous. While Dr. Crowther's case may have had an arteritis near the hip-joints, an arthritis in those joints is a more probable explanation of the sudden pain around the hips. The late Dr. John Gray, who examined the temporal artery section in my first case, while not able to exclude polyarteritis nodosa, was more struck by a similarity of the condition to rheumatic arteritis.[1] I have recently had a case[2] of a febrile illness with headaches, arthritis, and the general manifestations so like those of severe "temporal arteritis" that, though the temporal arteries appeared clear, I felt that it was almost certainly a case of that condition.

We should not regard the joint symptoms, the cerebral symptoms, or scalp ulceration as complications so much as different aspects of this complaint. No one denies that its most striking features are polyarteritic and, in particular, an arteritis of the temporal vessels. But the degenerative collagen changes are soon seen to be both periarterial—hence the very interesting and unusual scalp ulceration described by Dr. David Kendall (*Journal*, August 22, p. 418)—and widespread in other tissues. The fever, anaemia, loss of weight, and joint symptoms which are so often seen in temporal arteritis rank it as a generalized "collagen" or "pararheumatic" disease akin to rheumatism, acute diffuse lupus erythematosus, dermatomyositis, and the rest. Perhaps it is a manifestation of the hypersensitivity state largely peculiar to old people. Certainly prolonged cortisone and A.C.T.H. are its best treatment, with salicylates as a less effective reserve.—I am, etc.,

Edgware. G. H. JENNINGS.

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Sickle-cell Anaemia

SIR,—The paper on sickle-cell anaemia by Dr. G. M. Edington (*Journal*, October 31, p. 957) raises many important points, though perhaps none is more interesting than the observation that sickle-cell disease becomes less severe with age, and that, in fact, his oldest patient, aged 44 years, had no attacks or crises for nine years. It was already known that the onset of the disease is not at birth or even in very early infancy. Vandepitte and Louis[1] reported recently that they had discovered a test for sickle-cell anaemia which was positive even in babies with "preclinical" sickle-cell anaemia.

In Africa it has been difficult to accept the homozygous theory of sickle-cell anaemia of Neel[2] and Beet.[3] With the great number of Africans showing the sickling phenomenon one would expect a disease occurring in all homozygotes to be more common. It was then reported by the Lambotte-Legrands[4] and Foy and his colleagues[5] that a search among the younger age groups showed sickle-cell anaemia to be more frequent, and it was suggested that the disease was rare in adults because those who suffered from it failed to grow up. This seemed to be impossible at least so far as those African tribes were concerned in whom very high incidences of the sickling trait had been discovered[6]—so high that they had to include homozygotes. The sickling gene seems to vary in the amount of abnormal haemoglobin it confers in different families,[7] and it is possible therefore that in these tribes in many instances one gene produces rather less than 25% of the abnormal haemo-

globin, so that even homozygotes fail to accumulate the level of more than 50% which seems to be necessary to cause the anaemia. However, Dr. Edington's observation that sickle-cell anaemia becomes less severe with advancing age might go far in clarifying what up to now was a difficulty to those wanting to reconcile the homozygous theory with the sickle-cell anaemia incidence found in Africa. It is noteworthy that thalassaemia also becomes less severe with age, and, provided it is possible to keep those who suffer from it alive with transfusions, even severely ill children can become virtually symptom-free when they reach adolescence. Dr. Edington's observations tally with some of my own and in retrospect they fit in with what I noticed in some adults in Uganda.

It might be worth while in future investigations of sickle-cell anaemia incidence to differentiate between those homozygotes who actually suffer from the disease and the others who are at risk only. The first group would be found largely in childhood, and the second would include apparently healthy neonates and adults. In parallel with thalassaemia the purely clinical diagnosis of sickle-cell anaemia would then be divided into a major, minor, and minimal dyscrasia. On a recent visit to Greece I found that Professor Choremis already made such a subdivision for purely clinical reasons. The parallel between thalassaemia and sickle-cell anaemia can be carried further. Both the potentially lethal thalassaemia gene in Italy and Greece and the sickling gene in Africa should have died out rather than exist at the high frequency at which they are actually found. Neel[8] has recently summarized possible explanations for this apparent paradox. One is that a very high mutation rate reproduces the gene often enough to replace the loss caused by deaths from sickle-cell anaemia; another is that sickle-cell haemoglobin may confer a reproductive advantage balancing the genetic disadvantage—the theory of "balanced polymorphism." Thus Brain[9] recently drew attention to the possibility that sickle-cell haemoglobin might give relative protection against malaria parasites. This theory, if confirmed, would go far in helping to explain the geographical distribution of the trait (it is a fact that its incidence is high only in regions where there is much malaria) and would usefully supplement the purely anthropological approach to the phenomenon.

Thalassaemia and sickle-cell anaemia have in common a significant percentage of foetal haemoglobin in the red cells. It has recently been possible to differentiate between adult and young infants' red cells by means of a specific agglutinating serum,[10] and, although the number of tests is not yet large, the only adults whose cells were also agglutinated by the anti-foetal red cell agglutinin were all sickle-cell anaemia and thalassaemia major patients and some—but not all—carriers of the thalassaemia and of the sickling trait. This suggests that all these individuals had, in common with young infants, a component of their red cell envelope not found in normal adults. It may not be a coincidence that the decline in the "natural resistance" of the newborn to malaria takes place when it loses its foetal haemoglobin.—I am, etc.,

H. LEHMANN.

London, E.C.1.

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Anal Fissure in Children

SIR,—In the descriptions of fissure in ano which appear in general medical journals there is often no reference at all to its occurrence in children (*Journal*, October 10, 1953). Yet this common condition is possibly even commoner in childhood than in adult life. It is true that the natural history of anal fissure is similar in adults and children, but a few differences are worth noting.

In the large majority of children in whom a fissure is found the onset can clearly be dated back to a time when large constipated stools were passed, often with an acute febrile illness; occasionally, and especially in infants, the onset synchronizes with a bout of acute enteritis. The typical case presents as a child who, with dramatic suddenness, has developed an intense fear of defaecation. The abdomen is often distended, there may be bouts of abdominal pain, and sometimes defaecation is accompanied by vomiting. In the worst cases, in which chronic obstipation has been allowed to develop, a "rockery" of faecal masses can be felt in the abdomen, and in a few overflow incontinence of stools occurs. In childhood sentinel tags are uncommon, and complications such as mucosal polyp, abscess formation, and fistula formation extremely rare.

The results of simple medical treatment are almost uniformly good, and possibly children are more amenable than adults in this respect. In 30 consecutive patients a cure resulted in 27; 2 further patients did not return to report progress; and in 1 other the fissure had not healed completely after intermittent (and possibly inefficiently applied) treatment over a period of several months. In all but a few the treatment was carried out by the mother at home. In a small number in whom the mother's co-operation was doubtful, and the response unsatisfactory, medical treatment was repeated in hospital with good results. In a few severely constipated cases olive oil enemata were given as a preliminary measure. Fissures seen in the acute stage healed within two, or at most three, weeks. The chronic fissures sometimes took several weeks to heal, but eventually disappeared completely. In one child a fissure recurred after apparent cure, but this was probably due to obstipation in a patient with grossly defective toilet training.

The essential of treatment is to relieve pain and the consequent spasm which prevents healing of the fissure. For this purpose 1% amethocaine ointment was applied to the raw area: in this strength it proved effective, and there were no examples of induced skin sensitivity which has been described with higher concentrations in adults. The mother was shown how to insert the ointment on a pledget of wool firmly wrapped on an orange stick or on the tip of her small finger (with the nail cut short), a procedure which she was instructed to carry out three times daily and particularly before defaecation was expected. Her relief, and the child's, at the demonstration of complete painlessness induced by the surface analgesic were potent factors in ensuring co-operation in treatment. The children were encouraged to defaecate at a regular time each day. Small quantities of liquid paraffin were given several times daily and continued for several months after cure. It was not found necessary to make any changes in the diet.

Although chronic fissures in childhood respond satisfactorily to treatment, and undoubtedly some acute fissures resolve spontaneously, it appears advisable to treat all cases early. By so doing not only is unnecessary suffering obviated, but the formation of a habit of chronic constipation (which can persist indefinitely even after the fissure has healed) is forestalled.—I am, etc.,

JOHN APLEY.

Bristol.

Thyrotoxicosis and Purpura

SIR,—The publication in the *Journal* of October 31 (p. 976) of the medical memorandum by Drs. W. G. D. Caldwell and M. Meikle on one of those rare cases in which thyrotoxicosis and purpura are associated prompts me to record the following case, the only one of this type which I met with amongst about 2,000 cases of thyrotoxicosis during the years 1921–51. I will report those details only which are relevant to the subject of the letter.

A married woman aged 40 was sent to me on September 11, 1948, suffering from typical thyrotoxicosis. She had had no treatment. On being given the choice of medical or surgical treatment she at once chose operation. She was admitted on September 13 and prepared with Lugol's solution, min. 7 (0.42 ml.) three times a day, until September 20, when I performed a bilateral subtotal thyroidectomy. As the iodine was given for the first time, she reacted very well. No iodine was given after operation. She had no upset and was sent home on October 1

with a healed wound and doing well. On my return from holiday a fortnight later I found an urgent message to visit her at once. She was in bed suffering from sleeplessness due to three days' intolerable itching in both lower limbs. She had many purpuric bruises on both legs and thighs, and stiffness of her knees. She was readmitted and the pathologist reported on her blood as follows: October 18, 1948, haemoglobin 80%; red cells 4,270,000; colour index 0.94; red cell morphology normal; leucocytes 9,100 (polymorphs 6,051, lymphocytes 2,457, monocytes 455, eosinophils 46, basophils 91); Arneth count, shift to left; platelets 185,000. No further purpuric areas appeared and the condition subsided without incident in two to three weeks. The stiffness of the knees improved, but did not altogether disappear for some months. She made a very rapid recovery from the thyrotoxicosis, was in full charge of her business two months after operation, and has remained in very good health.

On careful investigation of her history it was found that her symptoms had begun about five days before operation. She had spasms of coldness down her spine and stiffness of the knees, and had reported this to the nurses. It had continued after operation, but had not become really troublesome until after she returned home. The only explanation I could think of was that she had a rare idiosyncrasy to the potassium iodide in the Lugol's solution. Is it possible, if this view is correct, that the condition of severe thrombocytopenic purpura recorded in association with thyrotoxicosis may be due to long-continued administration of Lugol's solution in patients with a similar idiosyncrasy to potassium iodide?—I am, etc.,

Bradford PETER MCEWAN.

Niels Stensen

SIR,—Your paragraph on Niels Stensen (*Journal*, October 31, p. 992) contains the sentence: "He became a convert to Roman Catholicism and was nominated as Bishop of Titiopolis," which appears to give the impression that he was made a bishop merely as a result of, or as a reward for, his conversion.

Stensen's discoveries were not at first appreciated in his own country. He therefore went to Florence, where he was appointed anatomist to the Hospital of Santa Maria Nuova. It was while in this city that he became convinced of the truth of Catholicism, and he was received into the Church in 1667. Mainly through the influence of Griffenfeldt he was nominated to the post of Anatomicus Regius in the University of Copenhagen. He could not be made a professor to the university, as no Catholic was permitted to hold that position. Two years later he returned to Italy, where he began his studies for the priesthood. He received holy orders in 1675, and two years after was consecrated bishop. He worked in Münster, Osnabruck, Paderborn, and Cologne as a priest. He gave all his possessions to the poor and lived a life of mortification.—I am, etc.,

Llwynypia. M. S. PATHY.

Succinylcholine Chloride for Casualty Anaesthesia

SIR,—I should like to make a few points on the subject of succinylcholine chloride for casualty anaesthesia. First, Dr. D. C. Adamson has stated (*Journal*, October 31, p. 993) that he observed relaxation of the cardiac sphincter when succinylcholine was given during oesophagoscopy. I find it hard to believe that this is a property of the drug in question, as there are reasons for believing that it only acts on the striated muscle of the upper half of the oesophagus. Furthermore, the sphincter may be seen opening with each inspiration when the oesophagoscopy is carried out under local analgesia alone.

Secondly, I would like to stress that the sequelae of a combination of succinylcholine chloride and short minimal anaesthesia can be very uncomfortable to the patient. Distressing muscular stiffness appears to be by no means a rare complaint if these anaesthetics are carefully followed up. I observed another sequela while doing a series of some 30 anaesthetics for in-patient E.C.T. which I have not seen referred to. A high proportion of patients given thiopentone succinylcholine chloride developed sore throats after a variable delay of up to two hours. None given thiopentone gallamine triethiodide did so, and the further interesting fact emerged that it was those who had a completely or almost completely modified convulsion who developed the complaint. I am indebted to Dr. J. G. Bourne for the suggestion that this "sore throat" was the patients' interpretation of stiffness of the pharyngeal muscles. Had these been out-patients, or had an endotracheal tube been passed, I doubt whether this disadvantage of succinylcholine chloride would have been observed or properly interpreted.

Thirdly, I feel that casualty anaesthesia will always be administered in part by those who are not specialists in the field of anaesthesia, and the requirements of such a technique are safety, simplicity, effectiveness, and the use of drugs with which the administrator is likely to be familiar with apparatus which is likely to be already found in most casualty theatres. I think the following technique meets with these requirements: 5 to 10 ml. of ethyl chloride is sprayed into the empty chloroform bottle on a standard Boyle's machine and the cork is replaced. Two litres of oxygen and 6 litres of nitrous oxide a minute are run through the machine and the lever on the chloroform bottle is raised until the ethyl chloride can just be smelt emerging from the mask. Induction is then commenced.

This ensures adequate oxygenation and at the same time precludes access to the patient of a sudden strong concentration of ethyl chloride vapour.

Initially the mask need not be held against the face, and induction by this method appears to be much smoother and more pleasant to the patient than one would anticipate. The concentration of ethyl chloride is gradually increased, but it is rarely necessary to depress the plunger on the bottle. Emergence is rapid, overdosage is almost impossible, and neither salivation nor vomiting is a feature of this technique.—I am, etc.,

Thornton Heath. V. P. WORDSWORTH.

Laryngeal Vertigo

SIR,—Dr. C. W. M. Whitty's "cough syncope" (*Journal*, November 7, p. 1047) is a better title than the present one. During the winter it is not an unusual occurrence for a patient in general practice to complain that a severe spasm of cough has produced a momentary blackout of vision or even loss of consciousness. But, when this complication under the misnomer of laryngeal vertigo was the plea in defence of a suspected drunk-in-charge, I, as the police medical witness, agreed with the opposing counsel that I had never before seen a case (and was therefore presumably unfit to recognize one). However, in his turn, the otorhinolaryngologist appearing for the defence had to admit that his only personal experience of such a case was a wartime one in which he had advised the grounding of an R.A.F. pilot—in fact, the present defendant.

May it not be that the few cases which have filtered into a specialist department have given both title and apparent rarity to this "general practice" symptom?—I am, etc.,

Ilford. R. N. C. SMITH.

A Case of Anthrax

SIR,—I feel that the following case is sufficiently unusual to be worthy of record.

A woman of 27, a Civil Servant, was admitted to hospital on July 9. About seven days prior to admission she noticed a small spot on the skin over the right clavicle which she thought was due to an insect bite. Very soon swelling of the surrounding skin occurred, and this spread to involve the right side of the neck and the front of the chest. The swelling was painful and there was considerable itching of the skin. On admission she was severely ill with a subnormal temperature and peripheral circulatory collapse. The blood pressure was unrecordable, but she was able to give a fairly clear history. The whole of the front of the chest, including the breasts, and the right side of the neck were swollen by very firm oedema and the overlying skin was erythematous and patchily haemorrhagic. Just above the right clavicle there was a shallow ulcer with a dark red base about 1 in. by ¼ in. (2.5 cm. by 1.25 cm.) in size. There was some serous exudate but no pus. A few inconspicuous vesicles surrounded the ulcer.

Anthrax was considered, but at first not seriously, as there was nothing in the history to suggest a possible source of infection. Fortunately swabs were taken both from the base of the ulcer and from one of the vesicles, and from each Gram-positive bacilli were found on direct examination. These were later proved to be *Bacillus anthracis* and the diagnosis was confirmed by pathogenicity tests. She was at once treated with penicillin, 1 million units six-hourly, until July 18. Recovery from the toxaemia and peripheral circulatory failure was reasonably rapid, but the oedema decreased slowly and the local lesion took nearly a month to heal completely. She was given terramycin, 2 g. daily, from July 20 to July 27. On July 17 she became pyrexial for the first time, and on July 18 she began to complain of pain in the calves, and this pain rapidly increased in intensity. By July 19 there was severe hyperaesthesia of both legs, marked loss of power in all the muscle groups of the legs, and some weakness of the wrists and hands. All the tendon reflexes were brisk and equal and a full neurological examination showed no other abnormalities. An irregular fever, reaching 103° F. (39.4° C.) on one occasion, continued until July 31. The pain and weakness gradually decreased and she was discharged from hospital free from all signs and symptoms on August 8. It was assumed that she had had an acute "toxic" polyneuritis, but the rapid recovery and the absence of changes in the reflexes seem to make this diagnosis unlikely. A lumbar puncture was not performed.

Infection in this case is believed to have been due to an insect bite. The medical officer of health for Croydon has informed me that no cases of human anthrax have been reported in the past few years, but that a case of animal anthrax was notified in December, 1952, at premises within two miles of the place in which the patient thought she had been bitten by an insect.—I am, etc.,

Thornton Heath, Surrey. G. P. BAKER.

Rupture of the Spleen after Glandular Fever

SIR,—The description by Mr. R. W. Tudor (*Journal*, October 10, p. 813) of rupture of the spleen in a case of infective mononucleosis recalls a similar example.

A schoolgirl, aged 6 years, who had had transient jaundice two months earlier, tripped on her nightgown when going upstairs and fell forwards. She was admitted to hospital with pallor, rapid pulse, and tenderness over the middle of the abdomen. Her condition was stationary over several hours. There was no evidence of blood in the stools and the urine was normal. The history of transient jaundice suggested the possibility of a previous haemolytic crisis. The medical registrar, Dr. C. Cohen, however, postulated a glandular fever with jaundice, splenomegaly, and subsequent rupture. In view of persisting abdominal rigidity, laparotomy was considered advisable, and this diagnosis was confirmed. The peritoneal cavity contained much clotted blood. The spleen was enlarged to about four times the normal size, and showed a rupture round the upper third, linear on the outer and contused on the inner aspect. Splenectomy was performed and a pint (0.57 l.) of blood was transfused. She made good progress, and she was discharged twelve days later.

Blood counts after operation showed: white cells 23,800 (polymorphonuclears 56%; lymphocytes 38%; monocytes 6%). On the fourth post-operative day: red cells 4,050,000; Hb 66% (9.7 g.%); white cells 19,700 (neutrophil polymorphonuclears 29%; lymphocytes 62%; monocytes 6%; eosinophils 2%; basophils 1%); reticulocytes 5%; platelets 527,000; Race–Coombs test negative; 4 nucleated red cells per 100 white cells; red cell fragility normal; moderate degree of microcytosis, but cells well filled with haemoglobin. Six days after operation the Paul–Bunnell test was positive in dilution of 1 in 128; thymol turbidity 9.4 units; thymol flocculation 2+; alcohol turbidity 14.7 units; zinc sulphate turbidity 9.4 units; colloidal gold 2; alkaline phosphatase 9.6 units. The urine showed absence of bile salts and bilirubin, and slight increase of urobilin. *Specimen.*—The cut surface of the enlarged spleen presented numerous small opaque white spots, less than 1 mm. in diameter, which were not raised above the surface. Microscopic examination showed the sinuses packed with blood, no gross sinus proliferation, but the Malpighian bodies enlarged as a result of central oedema. There was diminution of the lymphoid element of the Malpighian body and an increase centrally in the reticulo-endothelial cells.

Jaundice is not a usual accompaniment of glandular fever. The further occurrence of splenomegaly and of rupture of the spleen spontaneously or after minor trauma has been described in the relatively few cases to which Mr. Tudor has referred.—I am, etc.,

Carlisle. R. M. HILL.

POINTS FROM LETTERS

Appendix in the Hernial Sac

Mr. R. T. BURKITT (Nairobi) writes: I have just seen Dr. T. E. Winckworth's letter (*Journal*, September 5, p. 567). Some years ago I had a similar case, the gangrenous appendix this time lying in a small femoral sac. The interest in this case was accentuated by the fact that the patient was aged 92. If I remember rightly she made a satisfactory immediate recovery from the operation, but, as so often happens in old people, the enforced recumbency was too much for her and she died some weeks later.

Mr. N. N. IOVETZ-TERESHCHENKO (Georgetown, British Guiana) writes: Although Dr. T. E. Winckworth (*Journal*, September 5, p. 567) has not met anyone who has also found an appendix in a hernial sac, the condition is not particularly rare. In the first reported case of survival after removal of a perforated appendix the viscus was found in the sac of what was thought to be a strangulated right inguinal hernia (Hall, R. J., 1886, *N.Y. med. J.*, **43**, 662). Since then many cases have been reported, mostly from Latin countries. Personally, I have on eight occasions found the appendix in a hernial sac and removed it—three times in a right femoral hernia and five times in a right inguinal hernia. So far in only one case was the appendix actually acutely inflamed at the time of removal.

Oily Stools and Antibiotic Therapy

Dr. RUSTOM JAL VAKJL (Bombay) writes: In view of the extensive and universal application of newer antibiotics, I would like to call attention to an apparently common, though innocuous, side-effect of such therapy. Routine inspection of stools after the therapeutic use of newer antibiotics, such as aureomycin, terramycin, and erythromycin, has disclosed the frequent appearance (in over 10% of cases) of oily or fatty stools. Examination reveals a layer of oil or oily droplets floating on top of an otherwise healthy stool. The incidence of this phenomenon appears almost twice as great with erythromycin as with terramycin and aureomycin. The condition, which is apparently quite harmless, may appear even within 48 hours of the inception of antibiotic therapy and may outlast it by several days or weeks (up to five weeks in one case).

Succinylcholine Chloride for Casualty Anaesthesia

Dr. D. J. ADDERLEY (Epsom) writes: There is one stage in the use of succinylcholine chloride in the casualty department described by Drs. T. Vaz and J. M. Bishop (*Journal*, October 17, p. 885) at which difficulties may be experienced—namely, that at which the needle is introduced into a vein before strapping the syringe to the hand. I have found when giving succinylcholine chloride alone, prior to thiopentone for electro-convulsive therapy, that very small quantities of the drug released into the circulation give rise to most unpleasant sensations in a conscious patient. This has occurred, for example, when a second attempt at venepuncture has been necessary owing to extravenous leakage. The patient looks terrified, cries out, and raises his hand to his throat as if feeling choked. The quantity required to produce this effect could easily be injected in the early stages of this technique, but if care is taken to avoid this no trouble should arise.

Spectacles

Dr. M. ASTON KEY (Southsea) writes: Dr. C. F. Hadfield (*Journal*, October 17, p. 886) has quoted Dr. Samuel Gee as professing contempt for spectacles as a remedy for migraine. Let me recount the experience of another senior physician of one of our largest London medical schools, who told me himself that he had occasionally fallen unconscious in a twopenny tube train in an attack of migraine, and had been carried out and laid on the platform until he recovered. He had consulted four leading London oculists without benefit. He then consulted the late Mr. Ernest Clarke, who prescribed spectacles which immediately relieved him, and the trouble ceased.

Avalanche of Advertisements

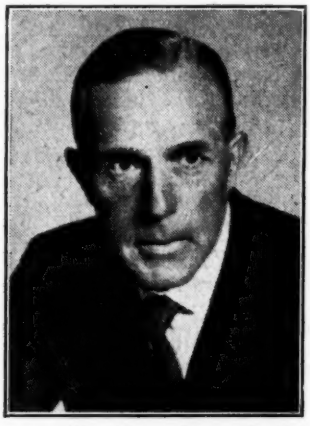
Dr. B. SANDLER (Urmston, Lancs) writes: I should like to draw attention to one of the minor nuisances in life which medical practitioners must suffer from advertisers in this country. Although I changed my surgery four years ago and have several times notified pharmaceutical houses I have never had even an acknowledgment of my letters, and an avalanche of advertising material still follows me round on my holidays and elsewhere. . . . Can anyone suggest a satisfactory method of informing these pharmaceutical houses that the net effect of their failure to address letters to the correct address is very effectively to neutralize the value of all their advertising?

Obituary

Sir LANCELOT BARRINGTON-WARD, K.C.V.O.
Ch.M., F.R.C.S., F.R.C.S.Ed.

Sir Lancelot Barrington-Ward, formerly Surgeon to the Household of the late King George VI, died at his home at Bury St. Edmunds on November 17 at the age of 69. Earlier this year he underwent a serious operation in the General Infirmary at Leeds.

Lancelot Edward Barrington-Ward was born at Worcester on July 4, 1884, the second of the five sons of the late Canon M. J. Barrington-Ward, all of whom were King's (or Queen's) Scholars at Westminster School and all of whom attained eminence in later life. One of his younger brothers, Mr. R. M. Barrington-Ward, was Editor of *The Times* from 1941 up to the time of his death in 1948. Lancelot Barrington-Ward was educated at Westminster and Bromsgrove Schools, gaining classical scholarships to both, and at Worcester College, Oxford, where he was a classical exhibitioner. For his medical training he went to Edinburgh and graduated M.B., Ch.B., with honours, in 1908. He was elected F.R.C.S.Ed. in 1910, became a Fellow of the Royal College of Surgeons of England in 1912, and in the following year proceeded to the Ch.M., again with honours, being awarded the Chiene medal in surgery in the same year. After holding the appointment of house-surgeon at the Edinburgh Royal Infirmary, he came south to The Hospital for Sick Children, Great Ormond Street, where he served successively as casualty officer, house-surgeon, and medical superintendent. His experience and interest in children's surgery gained him a post on the surgical staff of the hospital in 1914. On the outbreak of war later in that year he went off immediately to the Balkans, serving as surgeon-in-chief of No. 2 Serbian Relief Fund Hospital with the rank of honorary colonel in the Serbian Army Medical Service, and for this work he received the award of the Order of St. Sava. Later he worked as a surgeon in military hospitals in this country. When still a young man Barrington-Ward's ability as a surgeon was widely recognized, and he was called in during the illness of Prince Albert (later King George VI), on whom he performed an appendicectomy in 1918. During his lifetime he operated on other members of the Royal Family, including the late Queen of Norway. In 1935 he was created K.C.V.O., and in the following year was appointed Surgeon-in-Ordinary to the Household of the Duke and Duchess of York, continuing from 1937 as Surgeon to His Majesty's Household. Last year he was appointed an Extra Surgeon to the Queen's Household.



[Press Portrait Bureau, London

In addition to his work at Great Ormond Street Barrington-Ward was on the staff of the Royal Northern Hospital, where he eventually became senior surgeon, and he also had a large consultant practice. He was an examiner in surgery for the Universities of Edinburgh and St. Andrews. His experience in children's surgery is recorded in the many articles he published in various journals, and he wrote an excellent textbook entitled *Abdominal Surgery of Children*. He also edited and contributed to the *Royal Northern Textbook of Operative Surgery*. His work on idiopathic dilatation of the colon was of outstanding merit. He was appointed Hunterian Professor at the Royal College of Surgeons of England in 1952. His success as a surgeon was not due only to his technical skill and clinical judgment: he was a most gentle and sympathetic surgeon, and had the enviable knack of obtaining the confidence of the children who were his patients.

Barrington-Ward was a man of many parts, for, in addition to being a classical scholar—a rare accomplishment in a surgeon—and distinguished in his profession, he was a great sportsman, and knowledgeable enough about agriculture to have been made president of the Surrey Agricultural Association. On the Rugby field he was among the best players of his day, and was selected to play for England four times in 1910. He had the distinction of playing against Wales in the first international match played on the new Twickenham ground. Earlier he had played for Edinburgh University during six seasons, and was captain of the side in 1908. He also boxed for the University as a middleweight. In later years he became a keen golfer.

Barrington-Ward was twice married. His first wife, formerly Miss Dorothy A. Miles, whom he married in 1917, died in 1935, leaving him with three daughters. In 1941 he married Miss Catherine Reuter, and she survives him. There was one son of the second marriage.

B. C. MAYBURY, M.B., F.R.C.S.

Mr. B. C. Maybury died suddenly at St. Thomas's Hospital, Hydestile, Godalming, on November 15 at the age of 65. He had been ill since his summer holiday.

Bernard Constable Maybury, the third son of the late Dr. A. V. Maybury, of Portsmouth, was born on February 9, 1888. From Epsom College he went on to study medicine at St. Thomas's Hospital, graduating M.B., B.S., with honours in surgery, in 1910. He won many distinctions as a student at St. Thomas's, including the Treasurer's gold medal and the Cheselden medal for anatomy and surgery. He became F.R.C.S. in 1913.

After qualification Maybury held a number of house appointments at St. Thomas's until 1915, when he entered the R.A.M.C. to serve as a surgeon specialist in the first world war, first at Netley and later in France and Italy with No. 9 Casualty Clearing Station. He was particularly interested in peripheral vascular injuries at this time, an interest that he had acquired from Sir George Makins. He made many friends among the surgeons working at casualty clearing station, and at the end of the war a group of these surgeons founded the Travelling Surgical Club, the members of which visited surgical centres in most European countries between the two wars. Maybury was a very popular member and he derived great pleasure from the club's journeys and meetings. The two great influences in his younger days and during his training were Makins and Wallace. His interest in military surgery was inspired by them, and he carried on their teachings and traditions at St. Thomas's. He was appointed to the staff after the

first world war and was junior surgeon to Sir Cuthbert Wallace until the latter's retirement: they worked together in the founding of a professorial surgical unit at the hospital.

Maybury was essentially shy and retiring, and it was difficult to get him to write or to speak in public. His rare contributions to discussions at the Royal Society of Medicine were a joy to all who heard them, and his two most important contributions to surgical literature —the articles on peritonitis and diseases of the appendix, jointly with B. W. Williams, in Choyce's *System of Surgery*, and the treatment of traumatic false aneurysm and arteriovenous fistula in the *Bulletin of War Medicine* (1945)—will live for ever. A profound and critical thinker, he was scrupulous in his attention to detail. He had a horror of error and was himself the acme of integrity. When faced with an unusual or difficult clinical problem he was at his best, and the number of his colleagues who sought his advice on professional and other matters was the greatest tribute to his wisdom. He could be brusque on occasion, but none of his patients doubted his sympathetic understanding of their troubles.

He was an excellent teacher for the more intelligent, though sometimes it was difficult to hear all that he said. His skill as an operator was quite remarkable—he never made an unnecessary movement and appeared unhurried and deliberate; in fact he was a very rapid operator.

He retired from the staff of St. Thomas's at the age of 60, five months before the National Health Service Act became operative, and went to live in Hampshire, where he was extremely happy with his family and his house and garden. His services to Salisbury General Hospital, given in a purely advisory capacity, were greatly appreciated by all who benefited from them. He was a skilled craftsman, not only as a surgeon but also as a plumber and carpenter, and derived great enjoyment from these hobbies.

He married Miss Isobel Lyall in 1930 and she survives him, together with their two young children. All those who knew him will feel the loss of a true friend and a wise counsellor.—R. W. N.

We are indebted to Sir MAX PAGE for the following appreciation: B. C. Maybury was one of those intelligent and efficient people who do their full share of work in life with a minimum of self-advertisement—and this despite the fact that as a student he gained almost every prize and medal open to him and then proceeded to mount the surgical ladder steadily, except during some years of work at a casualty clearing station in the first world war. He was naturally a self-effacing and reticent man, and I think his close professional association with Sir George Makins and Sir Cuthbert Wallace caused him to develop a conservative and critical attitude towards surgical problems. He was a neat and speedy operator, and his mastery of the technique of abdominal surgery was generally recognized from the time of his casualty work in France till his full maturity at St. Thomas's. His clinical judgment was excellent, although as a teacher of the average student he was not popular. The more advanced student and the postgraduate, however, appreciated the sterling worth of his counsel. It is worth noting that among his patients were to be found many doctors and their relatives. "B.C." disliked committees and their works, but would attend if a matter which interested him was under discussion: he could then be strong in opposition if his convictions were challenged. He wrote little and then usually only under pressure from without; in his rare contributions in debate he spoke with authority and with a full grasp of his material. By his passing we may well regret the loss of one of the few remaining fully equipped surgeons of the past era.

C. F. MARTIN, M.D., C.M., F.R.C.C.

Dr. Charles F. Martin, formerly dean of the faculty of medicine and professor of medicine at McGill University, died in Montreal on October 28 at the age of 85. He was one of the leading medical men in Canada.

Charles Ferdinand Martin was born in Montreal and educated at Montreal High School and at McGill University, where he graduated in medicine in 1892. After a period of postgraduate study in Europe he returned to Montreal and was appointed lecturer on pathology and on medicine at McGill. He was also elected to the staff of the Royal Victoria Hospital in 1895. In time he became physician-in-chief there, and he remained on the consultant staff after his retirement in 1934. His contributions to medical literature reflected his interest in internal medicine and in medical education.

The medical school at McGill University owes much to Martin, who was professor of medicine and dean of the faculty from 1923 to 1936, and also acting principal of the university for a time. Much reorganization was undertaken during his tenure of office, and he persuaded many famous and able men to join him in his labours. In 1934 he collaborated with Dr. Wilder Penfield in founding the Montreal Neurological Institute. He played a leading part in the foundation of the Royal College of Physicians and Surgeons of Canada, and he served as president of the American College of Physicians (1928–9), the Association of American Medical Colleges (1929), and the Canadian National Commission for Mental Hygiene. In 1948 he was awarded the first Alfred Stengel Memorial Medal by the American College of Physicians, and only last June he received the Starr Award of the Canadian Medical Association for his work in furthering medical education in Canada.

Dr. WILLIAM MCINTYRE BROWN died on October 27 at his home at West Kirby, Cheshire, on his 83rd birthday. Born at Dublin in 1870, he was educated at University College, Liverpool, and took the degrees of M.B., Ch.B. of the Victoria University of Manchester in 1894. Soon after the foundation of the University of Liverpool in 1903 he received the corresponding degrees of the new university, proceeding to the M.D. in 1908. After graduation, he first held the appointment of house-physician at Liverpool Royal Infirmary, and then settled at West Kirby, remaining there in active practice until failing health forced him to retire in 1946. During the whole of this 50 years the welfare of his patients was his sole preoccupation. His skill and devotion gained him a large circle of patients and friends. He was one of the old type of practitioner who regarded his work as a privilege, and he could always find time to listen, advise, and comfort. His great kindness and sympathy towards all those in need of help will long be remembered.—P. B. P.

With the death on October 15 of Mr. W. BRITAIN JONES, of Middlesbrough, at the age of 76, the people of Tees-side have lost a well-known and much-loved personality. The son of the Rev. T. T. Jones, William Britain Jones was born at Rhymney, South Wales, on October 5, 1877. He received his medical training at University College, London, taking the London degrees of M.B., B.S. in 1909. After graduation he held a house appointment at Ashton-under-Lyne Infirmary, and in 1911 moved to Middlesbrough to become house-surgeon to the North Ormesby Hospital. Later he became honorary surgeon to the hospital and medical

superintendent and surgeon to the Municipal (now General) Infirmary, Middlesbrough. Apart from his hospital operating sessions and his work in private practice as a consulting surgeon, he devoted his life to the development of the General Hospital : its present high status owes much to his foresight, energy, and administrative powers. He was a quick and brilliant surgeon, and in spite of a very busy life he always found time to help a younger man in difficulties, a task he invariably approached with patience and tact. He had the welfare and training of his nurses very much at heart, and many of them owed much to his interest and help. A great individualist with marked personality, he never took kindly to red tape and unnecessary form-filling, and was never at a loss for most expressive language in which to voice his opinion. He was chairman of the Clevedon Division of the B.M.A. for a short time in 1940. A keen student of many subjects besides surgery, he took an intelligent interest in psychic phenomena and gave popular lectures thereon, for he was a gifted and fluent speaker. He leaves a widow, one daughter, and two sons.—J. E. M. P.

Dr. F. H. ALEXANDER, of Angmering, died on October 29 at the age of 77. He was one to whom B.M.A. members in Sussex owed so much. His brief fatal illness started within two hours of his last attendance at a meeting of the Sussex Branch council, of which he had been a member since 1927 ; and a few months ago he had a long and painful indisposition resulting from an injury sustained in his efforts to attend the annual general meeting of the Branch (of which he was president three years ago). He had been an active member of the West Sussex (formerly Chichester and Worthing) Division for as long as records exist, and he attended meetings of the executive committee with the greatest regularity for 30 years. He was chairman of the Division in 1929–30 and vice-chairman in 1930–1, and he had represented it on the Representative Body continuously since 1935. Frederick Hugh Alexander was born on April 17, 1876, and received his medical education at University College Hospital, obtaining the conjoint qualification in 1902 and the London M.B. two years later. He was in general practice at Littlehampton from 1905 to 1935, with the exception of his period of service as a captain in the R.A.M.C. in the first world war, service which included the Gallipoli campaign. Later he took a great interest in the British Legion and was a founder member of the Littlehampton branch and vice-president of the Sussex council. He was for many years divisional surgeon to the St. John Ambulance Brigade and was responsible for its reorganization and the invigoration of its activities in the Littlehampton area. Keen on sport of all kinds, he was for some time captain of the local hockey club and a vice-president of the cricket club, but in later years his own recreations were fishing and golf. He retired from practice in 1935 to Angmering, where he was a churchwarden and active in all village affairs. Throughout his life in Sussex he was universally admired for his gentleness and unassuming manner and for his unfailing kindness to all who approached him.—T. P. M.

The treasurer of the Medical Defence Union writes: Your admirable obituary notice (*Journal*, November 7, p. 1051) of "BILL" TUCKER (senior) prompts me to record an almost unknown incident connected with him. It happened in 1905 that I was medical officer on a steamer which called at Bermuda, so naturally I called on Tucker, for he and I had many times played football together. He gave me an excellent lunch, and that was the last time I saw him. Shortly after my return to England a man was apprehended who had been masquerading as Dr. W. E. Tucker and committing numerous frauds in connexion with purchases and sales of practices. One of the prosecution's needs was to prove that this man was not the man he pretended to be: somehow or other the late Dr. A. G. Bateman, then secretary of the Medical Defence Union, heard that I had recently been in Bermuda and "tipped off" Scotland Yard to that effect. I was thereupon visited by a C.I.D. officer, who questioned me as to my movements. On hearing that I had actually been Tucker's guest only two or three months before, he said, "You are the man we need," and promptly arranged to subpoena me to appear as a witness at the forthcoming Warwick Assizes. The prisoner, who incidentally was a man of about 60 and a bigamist to boot, had the nerve to cross-examine me when I declared in court that he was not the William Eldon Tucker whose name appeared in the *Medical Register* ; but, as has been demonstrated recently in other cases, to attempt to shake a witness who knows he is telling the exact and literal truth does not really help a defendant's case, and he was duly sentenced to three years' imprisonment. I at once joined the Medical Defence Union and have been a member ever since.

Dr. HUGO BOGER, who died on October 29 in the Hospital of St. John and St. Elizabeth at the age of 61, was the son of Dr. Hugo Boger, a medical practitioner who had a large general practice at Beni, in Bolivia. He was born at Reyes, Bolivia, on December 8, 1891, and was educated at St. Joseph's College, Norwood, becoming a medical student at University College Hospital during the first world war. In his final years there he worked single-handed as surgical dresser and unqualified house-surgeon to the late Mr. Wilfrid Trotter. He was captain of both the U.C.H. and the United Hospitals association football teams. After qualifying M.R.C.S., L.R.C.P. in 1922, he started a general practice among the South American and Spanish residents of London. In 1940, at the height of the air raids on London, he courageously took over a panel practice in Paddington because he wished to assist the country in which he had been resident for so many years. He liked panel practice so much that he continued it up to a few weeks before he was admitted to hospital as a patient. He was Vice-Consul for Bolivia in London for twenty-four years. Dr. Boger bore a striking resemblance to the late Henry Ainley, the actor, for whom he was frequently mistaken in the street. He leaves a widow, formerly Miss Dorothy Treadwell, a son, and a daughter.—A. M.

Dr. P. G. CARNEY, who died at his home at Clonskeagh, Dublin, on November 8 at the age of 63, had a distinguished career in the R.A.M.C. in both world wars. Born at Cootehill, County Cavan, in 1890, Philip Gerard Carney was educated at St. Mary's College, Dundalk, and at University College, Dublin, graduating M.B., B.Ch. of the National University of Ireland in 1914. After holding a resident appointment at the Mater Misericordiae Hospital, Dublin, he entered the R.A.M.C. in 1915 and served in France until 1918. He was awarded the Military Cross and the Croix de Guerre, with palm, in 1918 and for his war service he was admitted to the honorary degree of M.Sc. of the National University of Ireland in 1919. He then took a permanent commission in the R.A.M.C. and served in the Punjab and on the North-West Frontier of India until 1923, when he retired from the Army for family reasons. On return to civilian life he entered private practice at Cootehill, becoming district medical officer for the area in 1924. He re-entered the R.A.M.C. on the outbreak of the second world war in 1939 and saw service in France, the Middle East, and Greece until 1945, being mentioned in dispatches in 1944. Most of his time was spent in the Middle East, where he commanded a field ambulance in the second Libyan campaign against Rommel, and for two years he commanded the 53rd General Hospital at Haifa. He was released from the Army in 1945 with the rank of lieutenant-colonel and returned to his practice at Cootehill and to his duties as district medical officer until failing health forced his retirement in 1951. His outstanding personal qualities were simplicity and an unfailing kindness

and sympathy to everyone, especially the sick poor, by whom he was well loved. His intense interest in his work and his zeal for his patients never flagged, and if he had been less conscientious he might have been still alive. He died from arteriosclerotic hypertension. His chief hobbies were reading, archaeology, sailing on the broad lakes near Cootehill, and gardening.

Medico-Legal

DISTINGUISHING A PSYCHOPATH

During the trial at the Old Bailey on November 3 of Francis Wilkinson, 24, furnaceman, of Balham, who was sentenced to death for the murder of 5-year-old Miriam Susan Gray at the house where he was a lodger, Mr. Justice Hilbery queried the definition of the words "psychopathic personality."

Dr. Desmond Curran, psychiatrist, stated he had examined Wilkinson in Brixton Prison. "I have no doubt that Wilkinson should be regarded as the possessor of a psychopathic personality, or what is generally called an anomaly of character. I don't believe he is suffering from any mental disease."

The Judge asked what he meant by psychopathic personality. "I am collecting from various psychiatrists their definitions. Now, what is yours? *Psyche*, the soul, and *pathos*, illness: sickness of the soul I can appreciate; but what is your definition?"

Dr. Curran said he would read the definition as given by Dr. Denis Hill, who gave evidence before the Royal Commission on capital punishment. His definition was: "The diagnosis of psychopathic personality is made on persons of habitual abnormal behaviour, behaviour which has been abnormal from childhood; and the disorder of behaviour is seen in abnormal emotional reactivity, so that the individual who has it shows abnormal outbursts of temper, outbursts of emotional violence, and alcoholic excesses, often repeated, or suicidal attempts, and in some cases homicidal attempts."

The Judge: Does it mean the individual must exhibit all those things, those abnormalities, to be a psychopathic personality?

Dr. Curran replied he thought it was agreed that the individuals differed and there was no sharp dividing line.

The Judge: Every habitual criminal must be a psychopath if that is so.

Dr. Curran said he did not think every habitual criminal would show some of the features given in the definition.

The Judge: And what of abnormal behaviour? Do you agree normal behaviour is honest behaviour?—I don't know what is normal behaviour.

Mr. Christmas Humphreys (prosecuting): In the world of psychiatric medicine, is it right there is an elaborate classification of the disease of the mind?—Yes, there are many.

And in the study of psychiatric medicine there is at present a tendency to put into a new group those persons who do not suffer from a disease of the mind, but suffer from some form of character deficiency or emotional instability which makes it impossible for them to enter into normal contact with society?—Yes.

So when you say he is a psychopath, you are inferentially saying he is distinct from a person suffering from a distinct disease of the mind?—Yes.

Not within M'Naghten Rules

Dr. J. C. McI. Matheson, principal medical officer at Brixton Prison, who was called by the prosecution, said he agreed with Dr. Curran in that Wilkinson could be called a psychopath. He was not suffering from any mental disease which would bring him within the M'Naghten rules. But Wilkinson was abnormal.

The Judge: He is a misfit?—Yes.

The Judge ruled that there was no evidence that Wilkinson was suffering from a disease of the mind which would bring him within the M'Naghten rules.

According to the prosecution, Wilkinson, early on the morning of August 15, went into the kitchen where Miriam was sleeping, shone a torch on her, and hit her with the leg of a chair, fracturing her skull. He then made an attempt to assault her sexually.

Wilkinson's mother, Mrs. B. Wilkinson, said that her son had always been restless and could not sleep at night. No one would sit beside him in a cinema because he would disturb them by his restlessness. When he was 8 or 9 he had a great shock when he found a newborn baby torn in half in a dustbin. She found that one day he had broken a mirror because he could not bear to see himself; afterwards he told her he had not known he had done it. His father could not get on with him, and she broke the home up by leaving. She left because she could not stand it any longer.

Notice of appeal has been lodged.

Medical Notes in Parliament

LORDS' VIEWS ON SMOG

Lord AMULREE turned the attention of the House of Lords on November 18 to smog, describing its dangers to health and urging that action should be taken to prevent or minimize its occurrence, with particular reference to the extended use of smokeless fuel. In the severe fog of December, 1952, between 4,000 and 5,000 people died from the effects of the fog. There was also a big increase in the sickness rate.

The reason why the fog of 1952 was more dangerous than any suffered before was that there was a much greater concentration of sulphur dioxide in the air. It seemed that there was some kind of correlation between the sulphur dioxide content of the air and deaths from fog. More important was what could be done to stop the occurrence of fogs in future. Obviously it was going to take a long time, but one would like to know that the Government and local authorities were aware of the problem and doing something to meet it. What was being done, for example, to increase the use of smokeless fuels, which would go far to solving the fog question in general, and the formation of smokeless zones? A large range of industries was exempted from the powers given under the Public Health Act, 1936, but a firmer line should surely be possible in 1953. A new factor in London was the erection of power stations, of which there were nine on the banks of the Thames, in the valley where the worst conditions making for fog would occur. He was told that 97% efficiency could be obtained in washing the fumes. The solid part was efficiently extracted, but what was evil to health was the fumes. The N.H.S. fog masks, he thought, would not be of much value in dealing with the tiny particles, which could get round the corners of the mask and penetrate the gauze.

Lord HADEN-GUEST said it was calculated that 5,000,000 tons of domestic coal were consumed in Greater London during the six winter months. That sent into the atmosphere from 800 to 1,000 tons of smoke a day, 2,000 to 3,000 tons of sulphur dioxide a day, and up to 2,000 tons of carbon monoxide a day. One of the difficulties in the way of effective action was the simple administrative one that there was no single authority in London to control smoke pollution. The L.C.C. were taking preliminary steps to facilitate the formation of such an organization.

The EARL OF LISTOWEL mentioned some remedial measures which the L.C.C. would include in evidence to be submitted to the Beaver Committee. The first was to provide the public with information about the damage caused by fog. How many, for instance, knew that smokeless fuels gave off as much sulphur as coal or coke, or that fuel oil gave off half as much sulphur again as an equal weight of coal or coke? Even if there were smokeless zones the main evil of sulphur remained without a remedy. People contemplating the construction of new power stations must surely in the light of the second fact pause

for thought. Within an area of 20 square miles in London there were three large power stations—Battersea, Fulham, and Lotts Road—which burned 60% of all the coal used in the area. There was a lack of basic data from which firm conclusions could be drawn. A serious difficulty about washing the smoke was its expense.

No Authoritative Pronouncement

The EARL OF SELKIRK, Paymaster-General, said that the provision of smokeless fuel was only part of a big and intractable problem of long standing. Even were the atmosphere cleared of smoke there would still remain the problem of the colourless gases, sulphur dioxide and carbon monoxide. They were not yet in a position to make an authoritative pronouncement. Roughly half the smoke came from industrial plant, and the other half from the 16 million domestic grates. Only about a quarter of these grates could use coke, the only smokeless fuel available in any quantity. The high-grade smokeless fuels cost half as much again as coke, and unless their cost could be brought within the reach of the average householder there was no prospect of their making more than a small contribution to smoke abatement. He deprecated the banking up of coal fires at night, particularly in foggy weather, and said the Government would like that to be known. The cleansing of flue gases at power stations was a difficult subject. It was done at Battersea before the war, but there was no statutory obligation to carry it out. It was expensive, and not entirely satisfactory. The Beaver Committee would be making an interim report, which would be available in a few days' time.

Foreign Doctors and Dentists

Mr. RAYMOND GOWER asked the Minister of Health what steps had been taken to employ the services of foreign doctors now domiciled in this country. Mr. IAIN MACLEOD stated on November 19 that foreign doctors who had secured registration by the General Medical Council and who were domiciled in this country could, and did, take part in the National Health Service on equal terms with their British colleagues.

Doctors' Surgeries

Mr. A. BLENKINSOP asked the Minister of Health on November 19 what action he had taken to help secure an improvement in the condition and equipment of general practitioners' surgeries and waiting-rooms. Mr. IAIN MACLEOD said he understood that the chairman of the General Medical Services Committee of the B.M.A. wrote last month individually to all the 20,000 or so general practitioners taking part in the Health Service calling their attention to their responsibilities in providing a proper standard of surgery and waiting-room. He proposed to await the results of this approach.

Retiring Age

Mr. WILLIAM BLYTON asked the Minister of Health on November 19 whether, in view of the Government policy of encouraging people to continue working instead of taking a pension, he approved the action of a regional hospital board in terminating the contract of a doctor medical superintendent at the age of 60 years without consulting the hospital management committee principally concerned, who were desirous of retaining their medical superintendent. Mr. IAIN MACLEOD stated that under the terms and conditions of service of hospital medical staff a hospital doctor's regular contract came to an end when he was 65 (or 60 if he was a mental health officer), but his employing authority might retain him temporarily after that age. No approval on the Minister's part was needed.

Nerve Gas Experiments

Mr. IAN WINTERBOTTOM asked the Parliamentary Secretary to the Ministry of Defence what special inducements were offered to Servicemen to take part in dangerous experimental work, such as research into nerve gases. Mr. NIGEL BIRCH, replying on November 17, said that volunteers for special types of experimental work, including chemical warfare research, were paid sums which varied between the different kinds of experiments. This extra pay was normally at the rate of between 10s. and 15s. a week. The men were volunteers, the nature of the experiment was clearly explained to them, and they were given a chance to withdraw. There had been only one fatal accident since 1922.

Private Members' Bills

Among 19 Bills presented by private members in the House of Commons on November 18 was one by Colonel M. Stoddart-Scott "to make it compulsory for the exchange of certificates of medical examination between persons before marriage." The second reading was fixed for March 26, 1954.

There were also a Coroners Bill, "to amend the law on the fees and allowances payable by coroners to witnesses, to persons summoned to attend as witnesses, and to medical practitioners making post-mortem examinations by the coroner's direction or at the coroner's request (for February 12); an Animals (Cruel Poisons) Bill, to prohibit the killing of animals by strychnine or other cruel poisons, and to amend the Pharmacy and Poisons Act, 1933 (for March 12); a Protection of Animals (Anaesthetics) Bill, to repeal the Act of 1919 and to extend the provisions of the Protection of Animals Acts in relation to the performance of operations on animals (for February 12); and a Safety in Employment (Inspection and Safety Organization) Bill, to ensure the representation of employees in the establishment and maintenance of conditions of safety and health in employment, which is supported by Dr. A. D. D. Broughton and Dr. Barnet Stross (for February 26).

Industrial Diseases Benefits

The House of Commons gave an unopposed second reading on November 23 to the Industrial Diseases (Benefit) Bill. Mr. O. PEAKE, Minister of Pensions and National Insurance, explained that it extended the provisions of the Pneumoconiosis and Byssinosis Benefit Act, 1951, to cases of partial disablement. A large number of persons had failed to get compensation either under the Workmen's Compensation Acts or the industrial injuries scheme for two reasons; many had contracted pneumoconiosis before it was covered under the Workmen's Compensation Acts, and others leaving the prescribed industries had failed to prove their disablement within the time limit. It was believed that 15,000 cases were likely to succeed under the Bill. A flat rate of payment equal to one-half the rate payable for total disablement under the 1951 Act was proposed. It was estimated that in a full year the charge on the industrial injuries fund would be £750,000 for pneumoconiosis patients and about £50,000 to £60,000 for other diseases. The total cost would be about £1,500,000 a year, which would tend to diminish annually.

Dr. EDITH SUMMERSKILL welcomed the Bill on behalf of the Opposition. Dr. BARNET STROSS urged the need of a comprehensive cover to ensure that every human being was safeguarded if he was rendered ill or crippled by his occupation. Dr. H. MORGAN protested that this was a petty measure, and ran away from the responsibility of doing justice to men in the mining industry.

Certain dental charges have been repealed by regulations. They were imposed under the National Health Service Act, 1951. The charges concerned are those on dentures supplied as part of a course of clinical dental teaching at certain teaching hospitals. These are Guy's Hospital, King's College Hospital, the United Newcastle-upon-Tyne Hospitals, the United Leeds Hospitals, and the United Liverpool Hospitals. The regulations are the National Health Service (Remission of Dental Charges) (No. 2) Order, 1953.

Universities and Colleges

UNIVERSITY OF OXFORD

Sir Howard Florey, F.R.S., has been appointed the representative of the University on the governing body of the Lister Institute of Preventive Medicine.

Dr. A. G. McD. Weddell has been appointed delegate of St. Catherine's Society on the Hebdomadal Council.

In Congregation on August 1 the degree of B.M. was conferred on N. F. Brooks, J. W. Pearson (in absence), and Josephine Bradford (in absence).

UNIVERSITY OF CAMBRIDGE

The following appointments are announced: Dr. D. H. M. Woollam, University Lecturer in Anatomy; Dr. G. F. Roberts and Dr. B. M. Herbertson, University Lecturers in Pathology; Dr. A. P. Waterson, University Demonstrator in Pathology; and Dr. R. A. Parker, University Assistant Pathologist to Addenbrooke's Hospital, all with tenure from October 1, 1953, for three years.

In Congregation on August 1 the following medical degrees were conferred:

M.D.—*D. O'Brien, E. J. Holborow, B. H. Vawdrey, J. Gloster, E. G. Pyn, L. D. Osler, F. J. Y. Wood.

M.B., B.CHIR.—*P. M. O. Massey, W. B. Hepburn, E. D. Williams, Mrs. Esther S. Kerr.

*By proxy.

UNIVERSITY OF LONDON

Sir Archibald Gray has been reappointed a Crown Member of the Court of the University for a further period of five years from October 1, 1953.

The following have been nominated, appointed, or reappointed as representatives of the University on the governing bodies indicated in parentheses: Sir Archibald Gray, Dr. C. F. Harris, and Dr. Andrew Topping (British Postgraduate Medical Federation); Sir James Paterson Ross (Guy's Hospital Medical School); Professor Dorothy Russell (Institute of Ophthalmology); Dr. H. B. May and Professor H. R. Robinson, F.R.S. (Queen Mary College); Dr. M. I. A. Hunter and Professor J. Whillis (Royal Dental Hospital of London, School of Dental Surgery); Professor J. Z. Young, F.R.S., and Mr. E. G. Slesinger (St. George's Hospital Medical School); Professor W. C. W. Nixon (St. Mary's Hospital Medical School); Mr. J. P. Hedley (St. Thomas's Hospital Medical School); Sir Charles Harington, F.R.S., and Sir Archibald Gray (University College Hospital Medical School); Professor R. Hare (Wright-Fleming Institute of St. Mary's Hospital Medical School); Professor R. V. Christie (Inter-university Council for Higher Education in the Colonies).

The following have been recognized as teachers of the University in the subjects indicated in parentheses: *St. Thomas's Hospital Medical School*, Dr. J. G. Bourne (Anaesthetics); Dr. J. M. Tanner (Physiology). *St. Bartholomew's Hospital Medical College*, Mr. I. M. Hill (Surgery). *Royal Free Hospital School of Medicine*, Mr. J. C. R. Hindenach (Orthopaedics). *London Hospital Medical College*, Mr. J. E. Richardson (Surgery). *St. Mary's Hospital Medical School*, Dr. H. L. Thornton (Anaesthetics); Dr. W. F. Widdas (Physiology). *University College Hospital Medical School*, Mr. H. R. I. Wolfe (Surgery). *University College*, Dr. D. H. L. Evans (Anatomy). Dr. D. N. Baron has been granted probationary recognition for two years from July, 1953, as a teacher of pathology (chemical pathology) at Middlesex Hospital Medical School.

The title of Professor Emeritus of Physics in the University has been conferred on Professor H. R. Robinson, F.R.S.

The following candidates have been approved at the examinations indicated:

M.D.—*Part I:* Marion M. Ashforth, Marie J. Bouton, W. Brumfitt, P. H. Connell, H. Foster, P. Glasman, J. F. Horley, P. J. Koblenzer, F. H. Lumb, T. G. Paxon, J. C. Pond, H. R. C. Riches, J. J. Segall, B. Strickland.

M.S.—*Part I:* C. I. Cooling, E. L. John.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW

At a meeting of the Faculty held on September 7, with Dr. Andrew Allison, President, in the chair, E. Armitage and S. Sachdev were admitted Fellows of Faculty *qua* physician and R. S. Cowie was admitted a Fellow of Faculty *qua* surgeon.

INFECTIOUS DISEASES AND VITAL STATISTICS

Summary for British Isles for week ending **November 7** (No. 44) and corresponding week 1952.

Figures of *cases* are for the countries shown and London administrative county. Figures of *deaths* and *births* are for the 160 great towns in England and Wales (London included), London administrative county, the 17 principal towns in Scotland, the 10 principal towns in Northern Ireland, and the 14 principal towns in Eire.

A blank space denotes disease not notifiable or no return available.

The table is based on information supplied by the Registrars-General of England and Wales, Scotland, N. Ireland, and Eire, the Ministry of Health and Local Government of N. Ireland, and the Department of Health of Eire.

CASES in Countries and London	1953 Eng. & Wales	1953 Lond.	1953 Scot.	1953 N. Ire.	1953 Eire	1952 Eng. & Wales	1952 Lond.	1952 Scot.	1952 N. Ire	1952 Eire
Diphtheria	18	2	7	0	1	29	3	12	1	
Dysentery	358	71	206	1	1	413	18	95	0	
Encephalitis, acute	10	1	1	0		2	1		0	
Enteric fever: Typhoid	3	0	1	0	1	8	1	0	1	
Enteric fever: Paratyphoid	9	4	0	0	1	7	2	1 (B)	0	
Food-poisoning	138	16		0		85	7		0	
Infective enteritis or diarrhoea under 2 years				15					11	22
Measles*	1,030	31	25	14	49	11,223	1252	154	51	63
Meningococcal infection	21	2	12	0		34	3	19	4	1
Ophthalmia neonatorum	26	2	4	0		38	3	10	0	
Pneumonia†	506	33	153	3	3	575	48	292	1	1
Poliomyelitis, acute: Paralytic	60	1	16	3	8	65	3	6	2	6
Poliomyelitis, acute: Non-paralytic	34	3				21	1			
Puerperal fever§	205	20	12	0	1	259	43	10	2	1
Scarlet fever	1,187	58	217	22	74	2,094	120	345	27	84
Tuberculosis: Respiratory			157	35				160	25	
Tuberculosis: Non-respiratory			22	10				20	4	
Whooping-cough	2,175	135	293	40	33	1,449	77	83	32	84

DEATHS in Great Towns	1953 Eng. & Wales	1953 Lond.	1953 Scot.	1953 N. Ire.	1953 Eire	1952 Eng. & Wales	1952 Lond.	1952 Scot.	1952 N. Ire	1952 Eire
Diphtheria	0	0	0	0	0	0	0		0	0
Dysentery	3	1		0		1	1		0	
Encephalitis, acute		0			0		0			0
Enteric fever	0	0	0	0		0	0		0	
Infective enteritis or diarrhoea under 2 years	6	0	0	2	5	6	1	2	0	0
Influenza	14	2	1	0	0	11	0		0	0
Measles		0	0	0	1		1		0	0
Meningococcal infection		0	0				0			
Pneumonia	212	32	15	11	8	200	25			5
Poliomyelitis, acute	7	0	1		0	1	0			0
Scarlet fever		0	0	0	0		0		0	1
Tuberculosis: Respiratory	96	10	13	4	3	94	8	8	3	9
Tuberculosis: Non-respiratory		0	1	2	2		2	5	0	0
Whooping-cough	4	0	0	0	0	1	0		0	0
Deaths 0–1 year	195	21	21	7	29	211	19	37	7	8
Deaths (excluding stillbirths)	5,193	723	533	114	159	5,027	714	588	87	140
LIVE BIRTHS	6,950	985	833	185	398	7,212	1099	865	175	355
STILLBIRTHS	178	21	25			182	22	19		

* Measles not notifiable in Scotland, whence returns are approximate.
† Includes primary and influenzal pneumonia.
§ Includes puerperal pyrexia.

Vital Statistics

Trichinosis in Liverpool

Professor Andrew B. Semple, Medical Officer of Health for Liverpool, reports that up to the week ending November 21 some 68 cases of trichinosis had occurred in the Liverpool area over the previous two weeks. Eighteen of these patients have been admitted to hospital. Most of the cases are mild, but three patients are seriously ill. The source of the infection has been traced to a sausage factory in the city, and investigations are still proceeding to trace back the infection further. Nearly all the persons affected give a history of eating raw sausage meat. Further cases are still being found, and there is no evidence that new infections are occurring.

Infectious Diseases

The largest variations in the notifications of infectious diseases in England and Wales during the week ending November 7 were increases of 188 for measles, from 842 to 1,030, and 108 for whooping-cough, from 2,067 to 2,175.

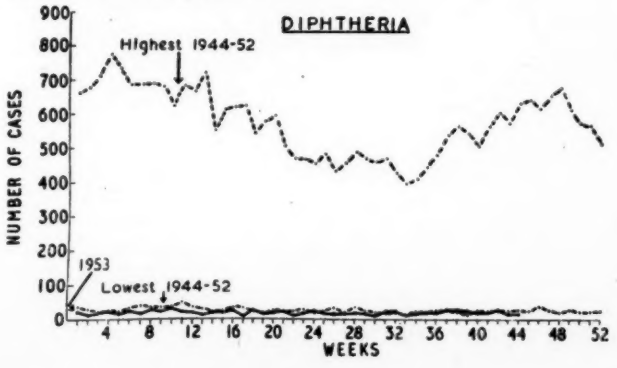
The largest rise in the incidence of measles was 73 in Cumberland, from 55 to 128, due to the outbreak in Workington M.B., where the cases rose from 51 to 121. The other large rises in measles were 42 in Lincolnshire, from 9 to 51 (mainly due to an outbreak with 32 cases in Horncastle M.B.), 43 in Lancashire, from 205 to 248, and 36 in Yorkshire West Riding, from 64 to 100. The largest rises in the notifications of whooping-cough were 42 in Lancashire, from 216 to 258, 38 in Surrey, from 53 to 91, and 37 in London, from 98 to 135. 1,187 cases of scarlet fever were notified, being 39 fewer than in the preceding week; the largest decrease was 29 in London, from 87 to 58. The number of notifications of diphtheria was 18, the same as in the preceding week. The notifications involved nine counties, compared with only four in the previous week. The chief features of the returns were decreases in Staffordshire from 9 to 5 and in Lancashire from 7 to 2.

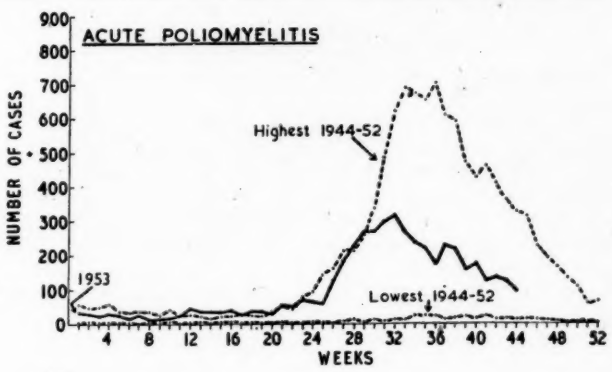
94 cases of acute poliomyelitis were notified; these were 28 fewer for paralytic and the same number for non-paralytic cases as in the preceding week. The largest returns were Lancashire 15 (scattered over 13 administrative areas); Wiltshire 9 (Calne and Chippenham R.D. 3, Highworth R.D. 3); Warwickshire 6; Yorkshire West Riding 6.

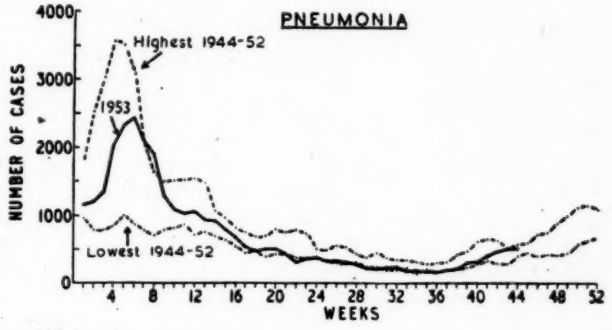
358 cases of dysentery were notified, 36 fewer than in the preceding week. The largest centres of infection were London 71 (Greenwich 12, Islington 10); Yorkshire West Riding 62 (Bradford C.B. 40); Lancashire 51 (Bolton C.B. 34); Yorkshire North Riding 28 (Middlesbrough C.B. 27); Essex 17; Middlesex 16.

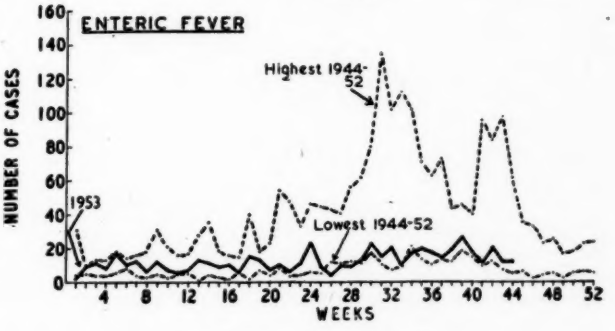
Graphs of Infectious Diseases

The graphs below show the uncorrected numbers of cases of certain diseases notified weekly in England and Wales. Highest and lowest figures reported in each week during the nine years 1944–52 are shown thus - - - - - - -, the figures for 1953 thus ———. Except for the curves showing notifications in 1953, the graphs were prepared at the Department of Medical Statistics and Epidemiology, London School of Hygiene and Tropical Medicine.









Week Ending November 14

The notifications of infectious diseases in England and Wales during the week included scarlet fever 1,400, whooping-cough 2,410, diphtheria 26, measles 816, dysentery 370, acute poliomyelitis 95, paratyphoid fever 1, and typhoid fever 1.

The Services

The name of Captain M. A. Lerner, R.A.M.C., appears in a list of those mentioned in dispatches in recognition of gallant and distinguished services in Malaya, during the period January 1 to June 30, 1953.

The President of the U.S.A. has bestowed the decoration of Legion of Merit, Degree of Legionnaire, upon Surgeon Captain T. B. Lynagh, R.N., for distinguished services in operations in Korean waters.

The *London Gazette* has announced the following awards by the President of the U.S.A. in recognition of gallant and distinguished services during the operations by the United Nations in Korea:

Legion of Merit, Degree of Legionnaire.—Colonel G. Anderton, O.B.E., late R.A.M.C., (now R.A.R.O.).

Bronze Star Medal.—Captain H. I. Jory, R.A.M.C.

The *London Gazette* has announced the award of (*a*) the Army Emergency Reserve Decoration and (*b*) First Clasp to the Army Emergency Reserve Decoration to Major R. F. Lawrence, R.A.M.C., retired.

Surgeon Commanders R. I. Bence, D.S.C., R.N.V.R., C. K. Churches, and S. A. Sewell, R.A.N.R., and S. L. Townsend, R.A.N.V.R., and Surgeon Lieutenant-Commander J. R. H. Peat, R.N.V.R., have been awarded the Royal Naval Volunteer Reserve decoration.

Medical News

Rabbit Myxomatosis.—The danger of this disease to laboratory rabbits kept for experimental purposes is pointed out in Newsletter No. 7 of the Laboratory Animals Bureau, M.R.C. Laboratories, Hollyhill, London, N.W.3. Vectors of the disease include mosquitoes and midges, and they should be prevented from entering rabbit houses by the proofing of windows and other openings. Airlock doors are needed, outer garments and footwear have to be changed by those entering the rabbit houses, and insecticides may be useful. Diseased rabbits should be killed immediately, the carcasses burnt, the cages disinfected, and contacts isolated for seven days. A strong immunity to myxomatosis, lasting for at least 12 months, can be conferred by vaccination with the Boerlarge strain of the Shope fibroma virus. The Bureau cannot say where the vaccine is to be obtained until the Carrington Committee investigating the Kent outbreak has reported.

Dr. Ludwig Guttmann, director of the spinal injuries centre at the Ministry of Pensions' Stoke Mandeville Hospital, has been awarded the rehabilitation prize of the World Veterans Federation. He is its first recipient. Dr. Guttmann was born in 1899 in Upper Silesia, and graduated at Freiburg University in 1924. By 1937 he had become medical director of the department of neurology and neurosurgery at the Jewish Hospital, Breslau, but in 1939 the policy of the Germans compelled him to leave. He then came to Oxford and worked on nerve regeneration. At the end of 1943 he was asked to start a spinal unit at the Ministry of Pensions Hospital, Stoke Mandeville. He was awarded the O.B.E. in 1950.

Help for Visitors.—A memorandum outlining social facilities for visitors from Canada and the U.S.A. is obtainable from Dr. G. Wolstenholme, Director, The Ciba Foundation, 41, Portland Place, London, W.1. The Horse Shoe Club exists to foster friendship and exchange of medical research and clinical workers between Canada, the U.S.A., and Britain. Details may be obtained from the hon. secretary, Dr. C. S. Nicol, St. Bartholomew's Hospital, London, E.C.1. The Society for Visiting Scientists aims to exchange ideas between scientists of Britain and those from overseas. It provides food and accommodation. Particulars may be obtained from Miss E. Simpson, assistant secretary of the Society, 5, Old Burlington Street, London, W.1. The Ciba Foundation, a trust independent of the pharmaceutical firm, arranges scientific conferences and also provides accommodation for visitors from overseas. Full information can be obtained from the Director, Dr. G. Wolstenholme, at the address above.

United Hospitals' Festival Choir.—The choir, conducted by Colin Ratcliffe, is to give two concerts next year at the Royal Albert Hall: the first is Mozart's "Requiem," with the Philharmonia Orchestra, on January 20, and the second (probably Verdi's "Requiem") with the London Symphony Orchestra on June 3. Rehearsals are held every Thursday between 8 and 10 p.m. at the Church of the Most Holy Trinity, Brompton. Membership is open to anyone who works in any capacity in any hospital, and applications will be considered from anyone who has done so in the past. There are vacancies for all voices. Requests for membership should be directed to the Choir Secretary, Flat 1, 93, Lexham Gardens, London, W.8.

Thunberg Memorial Volume.—Supplement 111 of *Acta Physiologica Scandinavica* (1953, vol. 30) is a memorial volume to Torsten Thunberg, the distinguished Swedish physiologist and biochemist, who died in 1952. He occupied the chair of physiology at Lund University from 1905 to 1938. The volume includes an account of his scientific work, a full bibliography of his writings, a description of the great new Institute of Physiology at Lund, and a number of papers from Thunberg's Swedish colleagues and friends.

Family Doctor.—A timely warning against the dangers of fire at Christmas time appears in the new issue of *Family Doctor*, with advice on fire-guards and first-aid. A new series of "How to Live with your Nerves," by Dr. Walter C. Alvarez, of the Mayo Clinic, begins this month. Sir Russell Brain, P.R.C.P., gives an account of the Royal College of Physicians, London, and Dr. W. Edwards writes about the patient's protest that doctors never tell you anything in hospital.

COMING EVENTS

Pyrogens.—A symposium on the assay and detection of pyrogens will be held at University College, London, W.C.1, on Friday, December 11. Particulars may be obtained from Dr. K. R. Capper, Pharmaceutical Society of Great Britain, 17, Bloomsbury Square, London, W.C.1.

Internal Medicine Congress.—The third International Congress of Internal Medicine will be held in Stockholm from September 15 to 18, 1954. The president will be Professor Nanna Svartz, and the secretary-general Professor Anders Kristenson. The two main subjects for discussion at the congress will be the pathogenesis and treatment of hypertension, and the common characteristics of mesenchymal diseases (collagenous diseases) and their nature. Further information may be obtained from Third International Congress of Internal Medicine, Karolinska Sjukhuset, Stockholm 60.

NEW ISSUES

Journal of Neurology, Neurosurgery, and Psychiatry.—The next issue (Vol. 16, No. 4) will be available in a week's time. The contents will include:

THE BRAIN-STEM LESIONS IN PARKINSONISM. J. G. Greenfield and F. Dawn Bosanquet.
ROENTGENOLOGICAL EXAMINATION OF THE ARNOLD-CHIARI MALFORMATION WITH THE ZIEDSES DES PLANTES PROCEDURE. H. Verbiest.
TEMPORAL LOBE EPILEPSY WITH PERSONALITY AND BEHAVIOUR DISORDERS CAUSED BY AN UNUSUAL CALCIFYING LESION. Murray A. Falconer and Desmond A. Pond.
SPINAL PATHWAYS SUBSERVING DEFAECATION AND SENSATION FROM THE LOWER BOWEL. P. W. Nathan and Marion C. Smith.
SUBSTANCES WHICH SUPPORT RESPIRATION AND METABOLIC RESPONSE TO ELECTRICAL IMPULSES IN HUMAN CEREBRAL TISSUES. H. McIlwain.
THE SEX-RATIO IN CONVULSIVE DISORDERS WITH A NOTE ON SINGLE-SEX SIBSHIPS. Christopher Ounsted.
PROGNOSTIC FACTORS IN ELECTRIC CONVULSIVE THERAPY. Robert F. Hobson.
BOOK REVIEWS.
INDEX TO VOL. 16.

Issued quarterly; annual subscription £2 2s., single copy 12s. 6d.; obtainable from the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1.

SOCIETIES AND LECTURES

A fee is charged or a ticket is required for attending lectures marked ●. Applications should be made first to the institution concerned.

Friday, November 27

INSTITUTE OF LARYNGOLOGY AND OTOLOGY.—3.30 p.m., clinical meeting for general practitioners. Mr. J. C. Hogg: Relationship Between Sinusitis and Chest Disease.

Saturday, November 28

WEST MIDLANDS PHYSICIANS ASSOCIATION.—At Queen Elizabeth Hospital, Birmingham, 11 a.m., autumn meeting.

Monday, November 30

INSTITUTE OF PSYCHIATRY.—5.30 p.m., Dr. E. Stengel: lecture demonstration.
LONDON UNIVERSITY.—At London School of Hygiene and Tropical Medicine, 5.30 p.m., Special University Lecture in Pathology by Professor J. R. Squire: Nephrotic Syndrome.
●POSTGRADUATE MEDICAL SCHOOL OF LONDON.—4 p.m., Dr. B. G. C. Ackner: Management of Some Common Sexual Difficulties.

Tuesday, December 1

BRITISH POSTGRADUATE MEDICAL FEDERATION.—At London School of Hygiene and Tropical Medicine, 5.30 p.m., Dr. W. D. M. Paton: Anticholinesterases.
INSTITUTE OF DERMATOLOGY.—5.30 p.m., Professor C. A. Keele: Hyperhidrosis.
KING'S COLLEGE HOSPITAL MEDICAL SCHOOL.—4.45 p.m., Thomas Percy Legg Memorial Lecture by Mr. V. E. Negus: The Relationship Between Rhinology and Laryngology and the Thyroid Gland.
MIDDLESEX COUNTY MEDICAL SOCIETY.—At North Middlesex Hospital, 3 p.m., clinical meeting.
ROYAL COLLEGE OF SURGEONS OF ENGLAND.—5 p.m., Arris and Gale Lecture by Mr. G. J. Hadfield: Effect of Hormones on Healing.
ST. MARY'S HOSPITAL MEDICAL SCHOOL.—At Wright-Fleming Theatre, 5 p.m., Dr. H. K. Waller and Dr. R. Lightwood: Breast Feeding.
WEST END HOSPITAL FOR NERVOUS DISEASES.—5.30 p.m., Dr. B. G. Parsons-Smith: neurological demonstration.

Wednesday, December 2

EDINBURGH CLINICAL CLUB.—At Royal Hospital for Sick Children, Edinburgh, 4 p.m., clinical meeting. Dr. Margaret MacK. Methven: Case Conference in the Psychiatric Department.

INSTITUTE OF DERMATOLOGY.—5.30 p.m., Dr. H. Haber: Bullous Eruptions of the Skin.

INSTITUTE OF UROLOGY.—4.30 for 5 p.m., Mr. F. R. Kilpatrick: Tuberculosis of the Renal Tract.

MIDLAND MEDICAL SOCIETY.—At Birmingham Medical Institute, 8.15 p.m., Mr. A. Lawrence Abel: Present Position of the Cancer Problem.

PHARMACEUTICAL SOCIETY OF GREAT BRITAIN.—7.30 p.m., Professor A. D. Macdonald: Applied Pharmacology.

ROYAL INSTITUTE OF PUBLIC HEALTH AND HYGIENE.—3.30 p.m., Sir Harold E. Whittingham: Hygiene and Sanitation in Aviation (illustrated).

SOCIETY OF PUBLIC ANALYSTS.—At Chemical Society, 7 p.m., Professor C. H. Gray: Recent Advances in Medical Chemistry.

Thursday, December 3

BRITISH POSTGRADUATE MEDICAL FEDERATION.—At London School of Hygiene and Tropical Medicine, 5.30 p.m., Dr. R. M. B. MacKenna: Scientific Approach to Dermatology.

CHADWICK TRUST.—At Wright-Fleming Institute of Microbiology, St. Mary's Hospital, 5 p.m., Malcolm Morris Memorial Lecture by Professor P. W. Windeyer: Radiotherapy in its Relation to Dermatology.

FACULTY OF HOMOEOPATHY.—At Royal London Homoeopathic Hospital, 5 p.m., clinical evening.

GLASGOW UNIVERSITY MEDICO-CHIRURGICAL SOCIETY.—At Glasgow University Union, 7.30 p.m., Professor J. N. Davidson: A Biochemist Looks at the Cell.

HONYMAN GILLESPIE LECTURE.—At University New Buildings, Edinburgh, 5 p.m., Dr. E. B. French: Pigmentation.

●INSTITUTE OF CHILD HEALTH AND INSTITUTE OF NEUROLOGY.—At National Hospital, Queen Square, W.C., 5.30 p.m., Dr. L. T. Hilliard: Mental Deficiency and Paralytic Syndromes.

INSTITUTE OF LARYNGOLOGY AND OTOLOGY.—At Royal College of Surgeons of England, 5 30 p.m., Dr. Michael P. Ward: Ascent of Mount Everest: Medical Problems.

LIVERPOOL MEDICAL INSTITUTION.—8 p.m., Symposium: Pathology of Tuberculosis.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—5.30 p.m., otolaryngology lecture by Dr. Michael P. Ward: Ascent of Mount Everest: Medical Problems.

ST. ANDREWS UNIVERSITY.—At Physiology Department, Dundee, 5 p.m., Mr. V. E. Negus: Ciliary Action.

ST. GEORGE'S HOSPITAL MEDICAL SCHOOL.—5 p.m., Dr. Denis Williams: neurology demonstration.

SOCIETY OF CHEMICAL INDUSTRY: MICROBIOLOGY GROUP.—At Medical Society of London, 6.15 p.m., papers by Professor M. Stacey, D.Sc., F.R.I.C., F.R.S., Mr. A. E. James, B.Sc., A.R.I.C., Dr. F. Fletcher, Mr. A. R. Lockwood, B.Sc., A.R.I.C., and Mr. A. W. Wilkinson on Dextran.

Friday, December 4

HEBERDEN SOCIETY.—At Royal College of Surgeons of England, 3.30 p.m., Heberden Oration for 1953 by Sir W. Russell Brain: Spondylosis: The Known and the Unknown.

INSTITUTE OF DERMATOLOGY.—5.30 p.m., clinical demonstration by Dr. R. T. Brain: Diseases of Children.

LEEDS AND WEST RIDING MEDICO-CHIRURGICAL SOCIETY.—Professor Charles Wells: The Suprarenal Gland, its Surgical Significance in Health and Disease.

●POSTGRADUATE MEDICAL SCHOOL OF LONDON.—4 p.m., film and commentary by Dr. R. G. Macfarlane: Marrow Puncture.

ROYAL MEDICAL SOCIETY, Edinburgh.—8 p.m., Dissertation by Mr. J. C. Guinard: Astronautical Medicine.

WHIPPS CROSS HOSPITAL MEDICAL SOCIETY.—8.30 p.m., debate. Motion: Corporal Punishment has no place in the Penal System of an Enlightened Society. Proposer, Mr. G. Benson, M.P.; Opposer, Dr. W. J. O'Donovan.

Saturday, December 5

MIDLAND TUBERCULOSIS SOCIETY.—At Birmingham Chest Clinic, Professor R. S. Pilcher: Bronchiectasis in Children.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Roads.—On November 13, 1953, at Shrewsbury, Salop, to Eve (formerly Daniel), wife of Peter Roads, M.D., a daughter—Gillian Mary.

Rugg-Gunn.—On November 20, 1953, to Patricia, wife of Surgeon Commander M. A. Rugg-Gunn, M.D., M.R.C.P., R.N., a son.

DEATHS

Barlet.—On November 4, 1953, at the French Hospital, London, W.C., Jehan Meredith Barlet, M.D., of Putney, London, S.W.

Blunt.—On November 10, 1953, at his home, Tyrrel Road, Chandler's Ford, Hants, Thomas Edward Blunt, M.R.C.S., L.R.C.P., Surgeon Captain, R.N., retired.

Cook.—On November 10, 1953, at Malvern Mill, Blockley, Glos, Robert Haldane Cook, M.D., aged 87.

Graham.—On November 6, 1953, Charles Lester Graham, M.B., Ch.B., J.P., of Netherby House, Wigan, Lancs, aged 67.

Henry.—On September 11, 1953, in Barbados, British West Indies, Arthur Martin Henry, M.R.C.S., L.R.C.P., L.D.S., Surgeon Lieutenant-Commander, R.N., retired, late of Chelmsford and Burnham-on-Crouch, Essex.

Luce.—On October 26, 1953, at her home, Milford, Surrey, Ina Marion Luce (formerly Clarke), F.R.C.S.I.

Shepherd.—On October 19, 1953, at his home, 27, Sea Lane, Goring-by-Sea, Sussex, Douglas Robert Chaplin Shepherd, M.B., B.S., M.R.C.P.

Stansfeld.—On October 24, 1953, at Brocklesbury, East Preston, Sussex, Dorothy Gales Stansfeld (formerly Parsons), L.M.S.S.A.

Sykes.—On October 30, 1953, at Glenbank, Kingussie, Inverness-shire, Stanley Parkinson Sykes, M.B., Ch.B., Lieutenant-Colonel, R.A.M.C., retired, aged 67.

Watson.—On November 6, 1953, at his home, The Elms, Church Street, Wellingborough, Northants, Andrew Watson, M.B., F.R.C.S.Ed.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Causes of Failure of Contraceptive Diaphragms

Q.—*What are the possible causes of failure of the diaphragm contraceptive cap? In the last year I have had 3 failures in 20 patients.*

A.—The diaphragm contraceptive cap ("Dutch cap") is remarkably reliable in the experience of those who specialize in giving advice and instruction in contraception. It must, of course, be used in conjunction with an efficient spermicidal jelly, of which there are several preparations on the market.

Unaccountable failures are rare, and a failure rate of 3 in 20 cases strongly suggests some error in the fitting of the diaphragm, inadequate instruction of the patient in its use, or failure on the part of the patient to follow instructions implicitly on all occasions. It is not uncommon for a woman who conceives to deny any breakdown in technique, only to confess years later that she did in fact depart from instructions. The commonest causes for failure of an occlusive diaphragm are:

1. Incorrect placing of the cap by the patient. Many women require long and patient instruction and few can feel their cervix unless specially taught to do so. If the cervix cannot be felt by the patient a watch spring (instead of a coiled spring) diaphragm may be easier and safer to use. Even then there should be a periodic check by the doctor to make sure that she is inserting it correctly.

2. Removal of the cap too soon after coitus. There should be an interval of eight hours.

3. Use of the cap without a spermicidal preparation, or the practice of coitus several hours after its insertion without supplementing the spermicidal jelly.

4. Omission of the cap on isolated occasions; sometimes the patient even forgets she has not inserted it.

5. The cap may not fit as well as it appears to do when tested in the doctor's surgery. At that time the woman may be nervous and tense, whereas during coitus the pelvic muscles are relaxed.

6. Use of the cap in cases in which it is not suitable. The coiled-spring diaphragm, for example, is not reliable if the vaginal walls are lax and the anterior fornix is shallow; retroversion is a contraindication in certain cases.

Abortifacient Pastes

Q.—*In "Pye's Surgical Handicraft" (1950, 16th edition, p. 386) utus (formerly aretus) paste is recommended as a simple and effective way of producing abortion up to about the sixteenth week. Is this a generally held opinion? If so, of what is the paste composed, and how is it applied?*

A.—Abortifacient pastes of the type mentioned have been marketed on the continent of Europe, in the United States, and in Britain since about 1930. They consist essentially of alkaline soaps medicated with iodine and astringents. They have a strong haemolytic and cytolytic action, and act by chemical rather than mechanical irritation of the uterine wall. The paste is injected (through the special cannula supplied with the tubes) into the lower part of the uterus, outside the membranes, the amount depending on the duration of pregnancy. Expulsion of the ovum generally takes place 24 to 36 hours after injection. Anaesthesia is not necessary, but the injection should be made slowly, without pressure, and with due regard to asepsis. If there is any pain or bleeding the injection should be stopped at once. The method should never be used during the first

six weeks of pregnancy, otherwise the paste may escape past the small ovum and enter the Fallopian tubes and peritoneal cavity. The above instructions are based on those issued by manufacturers of these pastes.

The advantages of this method of inducing abortion are simplicity in technique and avoidance of anaesthesia. Although the method is often successful, reports indicate that the process of expulsion of the ovum is sometimes protracted for as long as five or six days, and operative interference to complete the abortion is required in 10 to 20% of cases. It is claimed that this method avoids such risks as rupture of the uterus and laceration of the cervix which attend other procedures. Nevertheless, such risks are not excluded, and cases of perforation of the uterus by the cannula are recorded. In early pregnancy at least, the paste may pass through the tubes and give rise to pain and collapse, and even peritonitis. At any time during pregnancy there is a real risk of endometritis and salpingitis, as well as extensive necrosis of the uterine wall. The paste can penetrate the myometrium, and can enter the chorio-decidual space and the blood stream to produce severe and sometimes fatal haemolysis. Fatal embolism, septicaemia, and kidney and liver lesions are all recorded, while non-fatal sequelae include chronic pelvic infection and sterility. Even when major complications are avoided, the bleeding following the abortion tends to be unusually heavy and prolonged.

Cases illustrating all these types of ill effects are described by R. W. Weilerstein,[1] who also gives many references in the Continental medical literature, all of which indicate the dangers of abortifacient pastes. By 1932 there were already reports of at least 25 fatalities in the German literature alone. In 1932 the American Medical Association published a report[2] calling the attention of the medical profession to the dangers of this method of inducing abortion, and the same journal has since given repeated warnings in its editorials.

It is only in recent years that the use of abortifacient pastes has received much attention in Britain, but they now appear to be obtaining adherents who are naturally attracted by the simplicity of the method and do not always appreciate the risks. These pastes are neither as safe nor as efficient as is often stated, but it has to be remembered that the same can be said of nearly all methods for inducing abortion. It is a matter of choosing the method which is least dangerous for any particular patient.

REFERENCES

1 *J. Amer. med. Ass.*, 1944, 125, 205.
2 Ibid., 1932, 98, 215.

Sewage on the Garden

Q.—*At a large military establishment near here the raw sewage is passed through "digesting" tanks, where it remains for 12 days. It is then dried for periods of one to six months, depending on the weather. After this treatment it is used for garden manure. What is the risk of amoebiasis or other intestinal disease as a result of contamination of fruit or vegetables?*

A.—There is little risk of infection from this source. Amoebic cysts survive for only three to four weeks in water, and the higher the bacterial content of the water the shorter the life of the cyst. The practice outlined in the question is fairly uniform throughout the country, and no ill results are reported.

Cleft Palate

Q.—*Does a cleft palate ever close spontaneously, or is an operation always indicated?*

A.—A cleft palate never closes spontaneously; an operation is always indicated.

Curare and Peptic Ulcer

Q.—*Is curare of any use in the treatment of peptic ulcer?*

A.—I doubt if there is any scope for this drug in the management of peptic ulcer.

Suppositories for Hypnotics

Q.—*In Switzerland it is not unusual to give hypnotics as suppositories. The idea is to prevent the cases of overdosage which sometimes occur when hypnotics are taken by mouth. May I know your expert's opinion of this practice, and also a suitable prescription for giving a hypnotic in this way?*

A.—The rectal administration of drugs is more popular on the Continent than in Britain. Except in certain special cases there is no particular advantage in administering drugs in this way. Anyone intent on taking an overdose of barbiturates could swallow the suppositories and so produce the lethal effect. Thus the safeguard of rectal administration in this respect is slight, though perhaps there is less likelihood of suppositories being swallowed inadvertently than pills. Further, barbiturates can on occasion produce a very irritant effect on the rectum, and their rate of absorption is much more variable when administered in this unaesthetic way. Quinalbarbitone sodium ("seconal") is made up in suppositories containing 0.13 g., while the slightly longer-acting sodium amylobarbitone ("sodium amytal") is available in suppositories of 0.2 g.

Ergot Preparations and Migraine

Q.—*Are any ill effects likely to follow the prolonged and frequent use of dihydroergotamine for migraine? A woman in her early forties is getting increasingly frequent attacks of migraine, and this drug affords the most certain relief of any remedies tried. Can dihydroergotamine be used prophylactically?*

A.—Toxic effects from the use of ergotamine tartrate in the treatment of migraine are very uncommon, but occasional cases of ischaemic neuritis, gangrene of a finger, and exacerbation of anginal symptoms have been reported.[1] Dihydroergotamine is generally considered to be less toxic than ergotamine tartrate, and toxic effects from its repeated administration in migraine must be extremely rare. Dihydroergotamine may be used prophylactically, but the results are capricious, and its major value is when given at the first warning of an attack.

REFERENCE

1 *Proc. Mayo Clin.*, 1951, 26, 153.

Pendulous Breasts

Q.—*What is the best way of dealing with breasts that have become unduly pendulous after breast-feeding?*

A.—The most useful treatment is to ensure that the breasts are always kept well supported by a suitable brassière. Time alone will then probably improve matters. Exercise of the pectoral muscles—by breast-stroke swimming, for example—is sometimes advised, but is of doubtful value.

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